FLOWERING PLANTS OF GREAT BRITAIN

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1 SWEET CYPERUS
Cyperus longus

2 BROWN C
C fuscus

3 BLACK BOG RUSH
Schoenus nigricans

THE

FLOWERING PLANTS,

GRASSES, SEDGES, AND FERNS

OF

GREAT BRITAIN,

AND THEIR ALLIES

THE CLUB MOSSES, PEPPERWORTS, AND HORSETAILS.

By ANNE PRATT,

AUTHOR OF "OUR NATIVE SONGSTERS," "WILD FLOWERS," ETC.

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VOL. VI.

(BRITISH GRASSES, SEDGES, AND FERNS,
WITH 301 SPECIES COLOURED FROM NATURE.)

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LIST OF PLANTS

IN

BRITISH GRASSES AND SEDGES.

216 SPECIES FIGURED.

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Vahlii	Close-headed Alpine Sedge	245	3	32
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		Plate	Fig.	Page
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vaginatum	Hare-tail Cotton-grass	242	2	21
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ovina	Sheep's Fescue-grass	263	3	101
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		Plate	Fig.	Page
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Boehmeri	Purple-stalked Cat's-tail-grass	250	7	64
Michelii	Michelian Cat's-tail-grass	250	8	64
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Borreri	Borrer's Sea Meadow-grass	259	5	87
bulbosa	Bulbous Meadow-grass	261	1	92
compressa	Flat-stemmed Meadow-grass	260	3	89
distans	Reflexed Meadow-grass	259	4	87
fluitans	Floating Meadow-grass	259	2	85
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pratensis	Smooth-stalked Meadow-grass	260	4	90
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carinatus	Blunt-edged Club-rush	241	1	20
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maritimus	Salt Marsh Club-rush	241	2	20
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Spartina stricta	Twin-spiked Cord-grass	272	3	134
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		Plate	Fig.	Page
Triticum caninum . .	Fibrous-rooted Wheat-grass . . .	270	4	125
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*** *The Author and Artist must here express their thanks to* RICHARD PARNELL, ESQ., M.D., F.R.S.E., &c., &c., *who kindly permitted drawings to be made from various portions of his invaluable work on the Grasses of Britain.*

LIST OF BRITISH FERNS.

AND THEIR ALLIES.

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Germanicum	Alternate-leaved Spleenwort	297	2	214
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marinum	Sea Spleenwort	298	1	216
Ruta-muraria	Wall-rue Spleenwort	297	1	213
septentrionale	Forked Spleenwort	297	3	215
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Athyrium Filix-fœmina	Lady-Fern	294		202
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dentata	Toothed Bladder-Fern	292	1	198
Dickieana		292	2	199
fragilis	Brittle Bladder-Fern	291		197
montana	Mountain Bladder-Fern	293	1	200
Equisetum arvense	Cornfield Horsetail	311	1	281
hyemale	Rough Horsetail	311	2	286
limosum	Water Horsetail	311	3	288
Mackayi	Mackay's Rough Horsetail			290
palustre	Marsh Horsetail	311	4	291
sylvaticum	Wood Horsetail	312	1	292
Telmatcia	Great Horsetail	313	1	296
umbrosum	Shady Horsetail	312	2	295
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		Plate	Fig.	Page
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Ilvensis	Oblong Woodsia	279	1	171

The Artist wishes it to be understood that he has purchased from Mr. J. E. Sowerby *permission to copy from the Work lately published by him, entitled "The Ferns of Great Britain illustrated," certain details of the Plates, including the figure of the rare plant Gymnogramma leptophylla*

BRITISH GRASSES AND SEDGES.

Grasses constitute an important part of the vegetation of most temperate countries, forming large masses of verdure on plains and hill sides, and giving to the landscape that hue on which the eye can longest gaze untired, fringing the blue streams or crystal rills with their graceful leaves and flowers; or planted by the hand of man, in fields, ripening gradually from the delicate and tender blade of the Spring corn-fields into the rich brown of the full ear, which is to furnish our food. The Cereals, or corn grasses, are not natives of Britain; and of the large number of grasses which form the herbage of our fields, not more than twenty are fitted for the food of cattle. Many grasses grow even in water; some in running streams, others where the water is still. Some are peculiar to the mountains, others to the woodland; some to the sandy fields or shores, but not one will grow in the sea. Several grasses and sedges are invaluable, as, by the interlacing of their roots, they fix the ever-shifting sands; and without their aid we should often be overwhelmed by torrents of sand almost as fearful as those which appal the traveller in the desert. In other places grasses grow on upland and hilly ground, restraining

there the falling of the loose soil, while the wide-spread down, the chalky cliffs, and the wall top are made green by their presence. Besides their individual uses, they, in their mass, influence the healthy condition of the surrounding neighbourhood, for wherever this verdant covering of the earth is found it materially affects the atmosphere, especially with regard to the quantity of moisture; while the air which sweeps over the grass, laden with all the deleterious gases borne away from the crowded city, sweeps back again to the mass of mankind dwelling there, charged with a fresh supply of oxygen breathed forth from blades of grass and from leafy boughs, and replaces that which is vitiated by the respiration of man and animals.

Perhaps the season when the sight of the green meadows most delights us, is early Spring. How beautiful are they, as the sunlight comes down upon their gleaming blades, and the blue heavens are hanging over them! Every day the grass seems to become taller, and thicker, and greener. Multitudes of long slender leaves are blending with the foliage of various forms, which precede the Spring and Summer flowers, and

> "Grow like the summer grass, fastest by night
> Unseen, yet crescive in its beauty."

This rapidity of growth adds much to the interest with which we look on nature at this season. The scene of to-day is even richer than that of yesterday. It may be that a storm, accompanied by heavy rains, pours over field and valley, and its torrents might seem destined to beat down the tender grass to earth, and to strip the bending twigs of all their wealth of leaves. Yet that

storm shall but prepare the way for their quicker growth; for the electrical state of the atmosphere which follows it, is, of all conditions, most favourable to the rapid increase of vegetation.

The grassy turf which makes our meadows so bright and beautiful, and which adorns the landscape also of other countries in the colder portion of the temperate zone, is almost entirely absent from those lands on which the sun shines with its fullest power. Even in Southern Europe, where meadow lands more seldom occur, there begins to be some assimilation in the general appearance of the grasses to the taller species of lower latitudes; and reeds, which are with us of moderate size, rival the tree-like grasses which form so characteristic a feature of tropical scenery. The species of grass found in warmer lands are mostly different from those of our country, though some genera—*Poa*, for instance—are very widely distributed, and some species of this genus are found in all varieties of climate. Wherever we find grasses, we see them growing more or less socially. Tropical grasses are not only taller than ours, but they have flowers more downy and elegant, and broader leaves. The noble plants of the Bamboo family rise to the height of trees, forming, both in tropical and sub-tropical zones, vast and impenetrable forests; their slender stalks, reclining branches, and tall grassy leaves, reminding the native of northern countries of the willows of his own land, yet far excelling these in grace and beauty. Taller than even alders and oaks, these tree-like grasses wave more gracefully before the winds than our sturdy trees can do, and give a cheerful and airy aspect to the forest by their

light and tremulous motion, and their smoothly-polished yellow stems; while the gigantic sugar-cane family, though not so numerous, are scarcely less beautiful, as they wave their silvery flowers so gracefully to the wind.

In these warm regions the want of green meadows is not felt. The "cattle on a thousand hills" of the colder climate, are not needed in these; and the great Creator has spread therefore no vast pastures for their supply. The Hindoo who can dine on a dish of plantain or of rice, would be injured by any great quantity of animal food, and is directed by instinct to a vegetable diet. A slight herbage rises up at all times of the year, after the sudden shower or the long-continued rain; and this being sufficient to supply food for the horses, no hay is made in the East. During the rainy season, there are in some tropical countries, extensive tracts of grass; as, for instance, in the savannahs of America; but they are unmixed with wild flowers, such as our daisy, clover, and buttercup, and present no uniform mass of green-sward, and are often as tall as the traveller who is passing through them. Grasses of various kinds are to be found in more or less abundance from the equator to the poles. Several grasses, like the Alpine Foxtail, grow in the coldest regions in great luxuriance; and the Esquimaux, dwelling in the seventy-third degree of north latitude, has large patches of herbage green as an English meadow. Dr. Lindley remarks, "The great mass of herbage, known by the name of sedges and grasses, constitutes perhaps a twelfth part of the described species of flowering plants; and at least nine-tenths of the number of individuals composing the vegetation of the world."

Corn-fields are not less pleasing to our sense of beauty than grassy meadows; and, whether clad in the tender green of the Spring blade, or the full-brown of Summer, enliven and enrich our landscape. Many grasses beside those which are cultivated, afford seeds equally nutritious, though smaller in size. Indeed, the wheat, on which we depend so largely for food, and the origin of which was, till lately, undiscovered, seems now proved, by M. Fabre's experiments, to be but the cultivated form of the Ægilops, a grass infesting barley-fields on the shores of the Mediterranean. The grass, when wild, produces very small grains; but this botanist found on sowing it, summer after summer, that a crop of good wheat finally arose from its seeds.

When we consider how small the grains of corn are, it seems wonderful that man should have ever cultivated the cereal grasses for his nourishment. No doubt, the earliest cultivators were influenced in their choice of plants by the social growth of the grasses; and so, observing men, finding that plants bearing these nutritive seeds grew together in great numbers, sowed them on lands where they were wanting—where they could be protected from injury, and whence they could be gathered in their season.

Wherever now we see a corn-field waving in beauty, whether in the climes of east or west, or by the quiet homesteads which lie among the hills and valleys of our native land, it tells of peace, civilization, and domestic happiness; it tells of homes. The men who sowed the grains from which sprung those towering blades are not wild wanderers over the earth. Man must have a spot

to call his own, ere he will rise up early and work late, sowing the seed, or gathering in the ripened fruit; and the tillage of the earth brings with it softer manners, and gradual improvement in the arts and sciences of civilized life. The house is reared, and children learn beneath its roof the love of kindred, of neighbours, and of country; and agriculture proves the source alike of individual and of national prosperity.

A thorough knowledge of even the small number of grasses which adorn our meadows, fields, and woods, will demand a little patient study. The genera and species are now, however, by the labours of successive botanists, so well understood, and can be described by characters so distinct, that the student, aided by the plates, will find little real difficulty in obtaining a good acquaintance with this interesting and useful tribe of plants. Some of the varieties require considerable attention, as those of some species are very different in appearance from the type from which they have varied; and some grasses described as species will probably yet be found to be but varieties, changed by accidental circumstances of soil or situation. With few exceptions, the characteristics of the grasses can be detected by the help of a good pocket-lens; although a few genera, like those of *Agrostis* and *Aira*, in consequence of the small size of the spikelets, require examination with the microscope.

The term "grass," as employed by agriculturists, frequently has a far more extensive signification than that to which it is limited by the botanist, being applied to clover (called "three-leaf grass"), plantain, sorrel, and

many other flowering plants, which ordinarily form a constituent part of a hay-crop. This use of the word may be very convenient to those who, in their intercourse with each other, require some such comprehensive term which may include grasses and other plants fit for forming good pasture-land, or for being converted into hay; but the naturalist understands by "grass" such plants only as fall under the description given below of the GRAMÍNEÆ, a Natural Order of the Sub-class GLUMÁCEÆ. To this division it is altogether improbable that the botanist, however elementary may be his knowledge, will assign any of the flowering plants described in the preceding volumes; yet it is by no means so certain that the young student may not confound with the grasses other members of the Glumaceous Tribe belonging to the CYPERÁCEÆ, or Sedges; for these resemble the grasses so closely in their more obvious characters, that it requires a somewhat practised eye to discriminate them. The points in which the two Natural Orders agree are these:—the leaves are long, narrow, often channelled above, and pointed; they proceed mainly from the root, and grow in tufts: in both, the flowers are destitute of petals, being composed of scales or glumes, and are elevated on a straw-like stem, where they form terminal spikelets or heads, which are either erect or drooping. The characters in which the sedges obviously differ from the grasses are, that in the former the leaves are generally rigid and more or less of a sea-green or glaucous hue; the flower-stem is angular instead of round, solid or pithy and not hollow, and not jointed at the point from which a stem-leaf arises; and in those cases in which the

stem-leaf is furnished with a sheathing base, that sheath is never split. The separation of the two Orders is therefore so clearly a natural one, that a practised eye can at once decide to which of the two divisions any given specimen should be referred, no matter what may be its stage of growth—and that without minutely examining that part (the inflorescence, namely,) on which the distinction is in reality founded.

Not only in outward appearance, but in properties also, the sedges differ from the grasses. Growing often side by side, on dry heaths, in marshes, meadows, woods, on mountain tops, or on the sandy sea-shore, the grasses abound in starch and sugar, substances highly conducive to the nutriment of cattle; the sedges are remarkably deficient in them, and do not rank as "grass," even in the agricultural sense of the term; so that while the Glumaceæ comprise nearly all the plants which in the temperate regions are essential to man and the animals that he has domesticated, the Cyperaceæ are "weeds," unprofitable for food—and very frequently, like tares among wheat, appropriating soil and nourishment, which but for them would afford space and nurture for their more valuable neighbours. They must not, however, be denounced as utterly useless, nor are they even all to be classed with the "thorns and thistles,"—which, in accordance with the primeval curse, conveyed by implication a blessing on industry; the roots of several species are medicinal; the tubers of *Cypérus esculentus*, called by the French "Souchet comestible," or "Amande de terre," are used as food in the South of Europe, and are employed in the preparation of orgeat; and several species

of the same genus are cultivated in India and China for the wholesome food afforded by their tubers, which are said to resemble potatoes or yams. Nor must we forget, that to the tribe of CYPERÁCEÆ, or Sedges, belongs the *Papy'rus antiquórum*, which furnished the simplest and earliest of writing materials. In our own country one species is employed in making baskets and chair-bottoms; and others are eminently useful in binding together, by their creeping roots, the wandering sea-sands, or strengthening the banks of rivers and canals against the encroaching action of the water. Owing to the minuteness of the parts of fructification, and the close affinity which exists between many of the species, they are difficult of discrimination, and require to be studied with patience and accuracy. It is hoped, however, that the following descriptions, which have been divested as much as possible of technical terms, will enable the reader, assisted by the plates, to determine the names of at least the most strongly-marked species.

The extensive and difficult genus *Carex*, is divided below into several groups; and the student is recommended, before he begins to compare his specimen with either description or figures, to satisfy himself thoroughly, as to which group, and to which division of a group, it should be referred; otherwise he may happen to grow bewildered and to fling down his plant in despair.

ORDERS AND GENERA OF GRASSES AND SEDGES.

The large Sub-Class GLUMÁCEÆ (Glumaceous Plants) consists of two Orders, CYPERÁCEÆ and GRAMÍNEÆ; the former, containing the Sedges and their allies; the latter, the true Grasses. They differ from ordinary flowering plants in having their stamens and pistils enclosed in husks or glumes, instead of calyx and corolla.

ORDER CYPERÁCEÆ. SEDGES AND THEIR ALLIES.

Flowers either with stamens and pistils, or with stamens or pistils only; the lower ones often neuter, that is, without either stamens or pistils; each *flower* enclosed within a *single* scale or glume; *glumes* imbricated round a common central column, forming a *spikelet* or head, each glume occasionally enclosing a membranous investment of the stamens and ovary; *stamens* generally 3; *anthers* 2-celled, fixed by their base; *ovary* 1-celled, often surrounded by *bristles; style* 3-cleft, or rarely 2-cleft; *stigmas* undivided; *fruit* a 1-seeded nut.

** Flowers with both stamens and pistils; glumes in two ranks.*

1. CYPÉRUS (Galingale).—*Spikelets* 2-ranked; *glumes* numerous, keeled, nearly all fertile; *bristles* wanting. Name, the Greek name of the plant.

2. Schœnus (Bog-rush).—*Spikelets* 2-ranked, 1—4-flowered; *glumes* 6—9, outer ones smaller, empty; *bristles* small, or wanting. Name in Greek denoting "a cord," which was sometimes made from plants of this tribe.

* * *Flowers with both stamens and pistils; glumes imbricated on all sides.*

3. Cládium (Twig-rush).—*Glumes* about 6 in a spikelet, the outer ones smallest, and all but one or two empty; *bristles* wanting; *fruit* a coated nut. Name in Greek denoting "a twig."

4. Rhyncóspora (Beak-rush).—*Spikelets* few-flowered; *glumes* about 6, the outer ones smaller and empty; *bristles* about 6; *nut* slightly flattened, crowned with the dilated base of the style. Name of Greek origin, and signifying "beak-seed."

5. Blýsmus.—*Spikelets* arranged in the form of a 2-ranked spike; *glumes* imbricated on all sides, the outer ones longer and empty; *bristles* several; *nut* slightly flattened on one side, gradually tapering into the hardened style. Name in Greek denoting "a spring," near which plants of the genus grow.

6. Eleócharis (Spike-rush).—*Spikelet* many-flowered, solitary, terminal; *glumes* nearly all fertile, the outer largest; *bristles* 2—6, short; *style* 2—3-cleft, jointed upon the germen; *fruit* crowned with the permanent base of the style. Name from the Greek *elos*, a marsh, and *chairo*, to rejoice.

7. Isólepis (Mud-rush).—*Spikelets* many-flowered, terminal; *glumes* nearly all equal and fertile; *bristles* wanting; *styles* 2—3-cleft, not thickened at the base,

falling off; *fruit* slightly pointed, or not at all. Name in Greek denoting equal scales.

8. Scírpus.—*Spikelets* many-flowered, terminal; *glumes* equal, one or two of the outer sometimes barren; *bristles* about 6; *styles* 2—3, not jointed at the base, falling off; *fruit* slightly pointed, or not at all.* Name from the Celtic *cirs*, a cord.

9. Erióphorum (Cotton-grass).—*Glumes* imbricated on all sides, nearly equal; *bristles* finally assuming the form of long silky hair. Name from the Greek *erion*, wool, and *phero*, to bear.

* * * *Stamens and pistils in separate flowers.*

10. Kobrésia.—*Spikelets* of 2 flowers, the upper one bearing stamens, the lower a pistil, and included within a sheathing scale.

11. Cárex (Sedge).—*Glumes* collected into imbricated spikes; *fertile flower* of 1 pistil with 2—3 stigmas, invested by an urceolate† corolla, which is persistent and becomes the outer part of the fruit, enclosing the nut; barren flower of 3 stamens, corolla wanting. Name from the Greek *keiro*, to cut, from the sharpness of its leaves.

1. Cypérus (Galingale).

1. *C. lóngus* (Sweet or English Galingale).—*Spikelets*

* The plants contained in these three genera—*Eleócharis*, *Isólepis*, and *Scirpus*—are very difficult of discrimination, and appear to be admitted to a new arrangement by every botanist that treats of them. That of Hooker and Arnott is here adopted, as being the most recent.

† From the Latin *urceus*, an oblong vessel, swollen in the middle, and contracted above and below.

narrow, pointed, in erect twice-compound umbels; general *bracts* very long, leafy; partial, short; *stem* triangular; *root* creeping. A handsome but very rare plant, found only in a few marshes in various parts of England. The umbel is leafy and composed of unequal rays; the glumes are of a reddish brown hue, with green keels and whitish margins; the stem is from 2—3 feet high, and is sheathed at the base with several long leaves, after the habit of the larger sedges. The root is succulent, and filled with a nutritive and agreeable mucilage, to which a highly aromatic bitter principle is added, having tonic and stomachic properties. It flowers in July and August. (Pl. 238, f. 1.)

2. *C. fúscus* (Brown Cyperus).—*Spikelets* narrow, pointed, collected into small roundish terminal heads; *glumes* spreading; *bracts* 3, unequal; *root* fibrous. A small inconspicuous plant, only a few inches long, with fibrous roots and numerous trailing stems, first discovered in a meadow near Little Chelsea, and since found on Shalford Common, near Godalming, Surrey. It flowers in August and September. (Pl. 238, f. 2.) The genus *Cypérus*, which, from the useful properties of many of the plants that it contains, has been with propriety selected to give a name to the Order Cyperáceæ, comprises little short of 250 species, nearly all of which inhabit the warmer regions of the globe, increasing in numbers and luxuriance as we approach the Line. The genus *Carex*, on the contrary, is most abundant in high latitudes, where, according to Humboldt, it equals the grasses, and towards the Tropics dwindles away and almost disappears. Of *Cypérus*, two species only are

found in England; in Scotland none. The genus *Carex* contains upwards of sixty British species.

2. Schœnus (Bog-rush).

1. *S. nígricans* (Black Bog-rush).—The only British species. A rush-like plant, from eight to twelve inches high, composed of numerous erect, rigid, nearly round stems, some of which are barren, while others terminate in an abrupt head of black glumes, of which the outer one assumes the form of a bract and overtops the rest. The stems are clasped at their base by several blackish sheaths, terminating in short rigid leaves. The roots are composed of many long tough fibres, which extend to a considerable distance in the turfy bogs where the plants grow. The flowers, which are somewhat conspicuous from their large yellow anthers, appear in June. (Pl. 238, f. 3.)

3. Cladium (Twig-rush).

1. *C. Maríscus* (Prickly Twig-rush).—The only British species. A tall and robust marsh-plant, 3—4 feet high, with a strong, cane-like stem and very long narrow leaves, which, at the edges and keel, are armed with minute recurved teeth, like those of a fine saw, and terminate in a tapering triangular point. The stem is nearly round and bears several leaves, and the numerous spikelets are arranged in the form of a compound leafy panicle. It inhabits marshes and fens in several of the English counties, from Cornwall to Cheshire, and is most abundant in Cambridgeshire. It is also plentiful in Galloway, Scotland. It flowers



1 PRICKLY TWIG RUSH.
Cladium mariscus
2 WHITE BEAK R.
Rhynchospora alba
3 BROWN B. R.
R. fusca
4 BROAD LEAVED BLYSMUS.
Blysmus compressus
5 NARROW L. R.
B. rufus
6 CREEPING SPIKE RUSH.
Eleocharis palustris
7 MANY STEMMED S. R.
E. multicaulis
8 LEAST S. R.
E. acicularis

in July and August. There are usually about six glumes in a spikelet, of which only two or three bear flowers, and of these rarely more than one perfects fruit, which, when mature, is nearly as large as the spikelet. (Pl. 239, f. 1.)

4. Rhynchóspora (Beak-rush).

1. *R. álba* (White Beak-rush).—*Stem* divided, leafy, each branch bearing an abrupt crowded cluster of spikelets; outer *glumes* scarcely overtopping the spikelets. A slender grass-like plant, with stems about a foot high, several of which proceed from one root, and are accompanied by long narrow leaves. The flowers are of a singularly white colour, recalling the hue of straw bleached by the sun. It flowers from July to August, and is not uncommon in peaty bogs. (Pl. 239, f. 2.)

2. *R. fúsca* (Brown Beak-rush).—*Stem* leafy, bearing several oval heads of spikelets, which are overtopped by the leaf-like outer glumes. A rare plant, inhabiting bogs in Ireland and the south-west of England. In habit it resembles the last, but may at once be distinguished by its rich brown heads of flowers, which are accompanied by one or more long bracts, and its extremely narrow, almost bristle-like leaves. It flowers from July to August. (Pl. 239, f. 3.)

5. Blýsmus (Blysmus).

1. *B. compréssus* (Broad-leaved Blysmus).—*Stem* somewhat triangular; *spikelets* 6—8-flowered; outer

glume of the lowest spikelet with a leafy point; *leaves* flat and rough at the edges and keel. (Pl. 239, f. 4.)

2. *B. rúfus* (Narrow-leaved Blysmus).—*Stem* round; *spikelets* about 4-flowered; *glumes* all alike; *leaves* very narrow, smooth. The two species of *Blysmus* may be at once distinguished from all other Cyperáceæ by bearing their spikelets arranged on opposite sides of the stem, after the habit of wheat, or rye-grass. The stem of *B. compréssus* is from 6—8 inches high, and it grows in boggy pastures, often near the sea. *B. rúfus* is more slender and rigid, and is found in similar situations. Both species flower in July. (Pl. 239, f. 5.)

6. Eleócharis (Spike-rush).

1. *E. palústris* (Creeping Spike-rush).—*Stigmas* 2; *fruit* crowned with the flattened base of the style, shorter than the bristles. A rush-like plant, 2—3 feet high, destitute of leaves, and sending up from its widely-creeping root rounded stems, abruptly sheathed at the base, each of which terminates in a solitary oblong spikelet. Sides of lakes and ponds, common, flowering in June. (Pl. 239, f. 6.)

2. *E. multicaúlis* (Many-stalked Spike-rush).—*Stigmas* 3; *fruit* crowned with the triangular base of the style, longer than the bristles. Resembling the last, but smaller. The author has found specimens, the spikelets of which are viviparous, and bear plants furnished with roots and embryo spikelets. Flowering at the same time, and in similar situations, with the last. (Pl. 239, f. 7.)

3. *E. aciculáris* (Least Spike-rush).—*Stigmas* 3; *fruit* crowned with the almost globose base of the style;



1 FLOATING ISOLEPIS.
Isolepis fluitans

BRISTLE STALKED MUD RUSH.
J. setacea

SAVIS M. R.
J. savii

ROUND CLUSTERED HEADED M. R.
J. holoschœnus

5 LAKE CLUB R.
Scirpus lacustris

6 GLAUCOUS C. R.
S. tabernæmontani

7 TRIANGULAR C. R.
S. triqueter

8 SHARP C. R.
C. purpur...

bristles 2—3; *stems* tufted, round, exceedingly slender. A humble plant, 3—4 inches high, frequent among other marsh plants on the sides of lakes and in damp heathy places. It approaches in habit *Isólepis Sávii* and *I. setácea*, from which, however, it may be at once distinguished by the absence of bracts. It flowers from June to August. (Pl. 239, f. 8.)

7. Isólepis (Mud-rush).

1. *I. flúitans* (Floating Mud-rush).—*Spikelet* solitary, terminal; *stigmas* 2; *stem* floating, flattened, branched. A tufted grass-like aquatic, with numerous zig-zag stems 3—6 inches long, short sheathing leaves, and small ovate green spikelets, flowering from June to August. Common in lakes and ponds. (Pl. 240, f. 1.)

2. *I. setácea* (Bristle-stalked Mud-rush).—*Spikelets* 1 or 2, with an erect bract at the base, which greatly overtops the spikes; *stigmas* 3; *fruit* longitudinally ribbed and transversely striated. A humble plant, 3—6 inches high, forming dense tufts of very slender stems, which are leafy at the base. Common in wet gravelly places, and flowering in July and August. (Pl. 240, f. 2.)

3. *I. sávii* (Savi's Mud-rush).—*Spikelets* 1—3, with 1 or 2 spreading bracts, of which the longer slightly overtops the spikes; *stigmas* 3; *fruit* dotted, not furrowed. Closely resembling the last, from which, however, it may well be distinguished by the above character, and by its brighter green hue. It is common in the west of England, where it inhabits

bogs, and is found also in Scotland and Ireland, generally near the sea. Of late years it has been commonly exposed for sale in Covent Garden under the name of Isidore. Planted in a pot, and set to stand in a saucer of water, it soon fills the pot with innumerable evergreen bristling stems, which spread in all directions, and present a very pleasing appearance. The roots, meanwhile, penetrate into the saucer, which they line with a tangled mass of fibres. In its wild state it flowers in July and August. (Pl. 240, f. 3.)

4. *I. Holoschæ'nus* (Round cluster-headed Mud-rush).—*Spikelets* collected into globular heads. A distinct and very handsome rush-like plant, with round robust stems, 3—4 feet high, from about six or eight inches below the summit of which proceeds a panicle of six to twenty globular heads, of the size of small marbles, accompanied by a long spreading or deflexed bract. Said to grow on the sandy coast of Somerset and Devon, though no specific locality appears to be named but Braunton Burrows, an extensive tract of sand on the north coast of Devon. Here it undoubtedly grows, but can scarcely be discovered without some labour and difficulty, owing to the tangled jungle of grass and rushes, which must be penetrated and searched by the botanist. It flowers in August and September. (Pl. 240, f. 4.)

8. Scírpus (Club-rush and Bull-rush).

* *Spikelets numerous; stem round.*

1. *S. lacústris* (Common Bull-rush).—*Spikelets* forming a dense compound terminal panicle; *glumes* notched

and fringed, smooth. Margins of lakes and in running water abundant, varying, according to the depth of the water, from 4—8 feet high. This is one of the few British Cyperáceæ applied to any economical purpose, being often made into mats, and, when twisted, being also used to form the seats of what are called rush-bottomed chairs. Coopers also employ them in the caulking of casks. Many persons are in the habit of applying the term "Bull-rush" to any tall rush-like aquatic, especially to plants of the genus *Typha*, to which last the name Reed-mace is far more appropriate. It flowers from June to August. (Pl. 241, f. 5.)

2. *S. Tabernæmontáni* (Glaucous Bull-rush).—*Spikelets* forming a loose compound terminal panicle; *glumes* notched and fringed, rough. Closely resembling the last in habit, but much smaller, seldom exceeding the height of two feet, and readily distinguished by the glaucous hue of its stems. In the west of England it is far the commoner species of the two, and is very abundant also on the banks of the Clyde. It grows also in many other places, especially near the sea. It flowers from June to August. (Pl. 240, f. 6.)

* * *Spikelets numerous; stem triangular, leafless above; stigmas* 2.

3. *S. tríqueter* (Triangular Club-rush).—*Spikelets* clustered, some stalked, overtopped by the acutely triangular stem; *glumes* notched, the lobes blunt. Muddy banks of the Thames near London, and in the river Arun, Sussex, growing from 3—4 feet high, and flowering in June and July. (Pl. 240, f. 7.)

4. *S. púngens* (Sharp Club-rush).—*Spikelets* about 3; sessile, surmounted by the acutely triangular stem; *glumes* notched, the lobes acute. Not a British plant, though, like many others, unduly admitted into the English Flora as being a native of Jersey. (Pl. 240, f. 8)

5. *S. carinátus* (Blunt-edged Club-rush).—*Stem* round below, obtusely triangular above; *spikelets* in a compound terminal panicle. Growing in the same localities as *S. tríqueter*, where it attains a height of 2—4 feet; very rare, flowering in July and August. (Pl. 241, f. 1.)

* * * *Spikelets numerous; stem triangular, leafy; stigmas* 3.

6. *S. marítimus* (Salt Marsh Club-rush).—*Spikelets* arranged in several stalked and sessile clusters; *bracts* several, long and leafy. Common in salt marshes on most parts of the coast, where it flowers in July and August, forming large grassy tufts of long flat leaves, which frequently overtop the clusters of brown spikelets. Both leaves and stems are very harsh to the touch. (Pl. 241, f. 2.)

7. *S. sylváticus* (Wood Club-rush).—*Spikelets* forming a many-times-compounded terminal panicle; *bracts* several, very long, leaf-like. Moist woods, most frequent in the south of Scotland, but abundant also in South Kent, and occasionally met with on the banks of the Tamar, Devonshire. A robust and handsome species, 3—4 feet high, with broad and flat leaves, and a very large number of small green spikelets, clustered together in groups of two or three. It flowers in July. (Pl. 241, f. 3.)



1 BLUNT EDGED CLUB RUSH
Scirpus carinatus

2 SALT MARSH C R
S. maritimus.

3 WOOD C R
S. sylvaticus

4 CHOCOLATE HEADED C R
S. pauciflorus.



1 ALPINE COTTON GRASS
Eriophorum alpinum

2 HAIR TAIL C G
E. vaginatum

3 ROUND HEADED C G
E. capitatum

4 BROAD LEAVED C G
E. latifolium

5 NARROW LEAVED C G
E. angustifolium

6 SLENDER C G
E. gracile

* * * * *Spikelet solitary, terminal; stigmas* 3.

8. *S. pauciflórus* (Chocolate-headed Club-rush).—*Stem* round; *sheaths* leafless; two outer *glumes* obtuse, shorter than the spike. Boggy moors and commons in Scotland, and several parts of England. The stems are 4—10 inches high, resembling in habit those of *Eleócharis palústris*, but well distinguished by the above characters, as well as by the differently formed fruit. It flowers in July and August. (Pl. 241, f. 4.)

9. *S cæspitósus* (Scaly-stalked Club-rush).—*Stem* nearly round; *sheaths* with narrow awl-shaped leaves; two outer *glumes* acute, longer than the spikelet. Moist heaths, common. A small plant, 2—4 inches high, with numerous erect stems, many of which bear no spikelets. "This plant is called *Deer's Hair* in the Highlands, and yields an abundant food to sheep on the mountains in spring."—*Sir W. J. Hooker.* It flowers in June and July. (Pl. 241, f. 5.)

9. Eriόphorum (Cotton-grass).

* *Spikelet solitary.*

1. *E. alpínum* (Alpine Cotton-grass).—*Stem* triangular, rough; *leaves* much shorter than their sheaths; *spikelet* oblong. An elegant little plant, which formerly grew in the Moss of Restenet, near Forfar, but has disappeared in consequence of the Moss being drained. (Pl. 242, f. 1.)

2. *E. vaginátum* (Hare's-tail Cotton-grass).—*Stem* round below, triangular above; lower *sheaths* of the stem terminating in long leaves, upper one leafless,

inflated; *spikelet* oblong. A strikingly handsome plant from 12—14 inches high, not unfrequently found in great abundance on damp moors, where it flowers in spring, but is made conspicuous later in the season by the enlarged bristles of the flower, which assume the appearance of white floss silk. Each spikelet is about an inch and a half in diameter on a slender stalk, three-fourths of the upper portion of which is naked. Near the base is a loose striated sheath, and the very narrow leaves which clasp the stem are furnished with sheaths of the same character. (Pl. 242, f. 2.)

3. *E. capitátum* (Round-headed Cotton-grass).—*Stem* round throughout; lower *sheaths* bearing short leaves, upper one leafless. Resembling the last in habit, but smaller. Once found by Mr. G. Don, by a rivulet on Ben Lawers, near perpetual snow. It flowered late in summer. (Pl. 242, f. 3.)

* * *Spikelets more than one.*

4. *E. latifólium* (Broad-leaved Cotton-grass).—*Stem* in its upper half triangular; *stalks of the spikelets* rough; *leaves* flat, becoming triangular above the middle. Flowering in May and June, in boggy ground; rather rare. (Pl. 242, f. 4.)

5. *E. angustifólium* (Narrow-leaved Cotton-grass).—*Stem* round or nearly so; *stalks of the spikelets* smooth; *leaves* becoming triangular below the middle. Boggy and peaty ground, common; flowering in May and June. (Pl. 242, f. 5.)

6. *E. grácile* (Slender Cotton-grass).—*Stem* slightly triangular; *stalks of the spikelets* downy; *leaves* triangular

throughout. Boggy ground, rare. This species grows near Halnaby, Yorkshire, at Whitemoor Pond, near Guildford; on Ben Lawers and the Clova Mountains; and at Cwm Idwell, North Wales. It flowers in July. (Pl. 242, f. 6.)

Great difference of opinion exists among botanists as to the number of species to which the many-spiked Cotton-grasses should be reduced. The three above described appear to be distinct; and if the number and comparative length of the bristles be taken into consideration, several others may be added. *E. angustifólium* is by far the most common, and, without doubt, the most beautiful. Enlivening, as it frequently does, extensive tracts of moorland with its silky tufts, too delicate apparently to bear the gentlest breeze, yet bending unhurt before the sweeping gale, it converts the desert waste, as it were, into a flower-garden. For, though it is not in its perfect beauty until its seeds are matured, the heads of dazzling white down have on the landscape the effect of flowers, and might be mistaken at a distance for clusters of gigantic snowdrops, springing from a strange soil at a season yet more strange. It grows from twelve to eighteen inches high. With the silky substance which invests the seeds, paper and wicks of candles have been made and pillows stuffed. A foreign species, *E. comósum*, is remarkable for the toughness of its leaves, and is extensively employed in the Himalayas, under the name of *Bhabhur*, in rope-making.

10. Kobrésia.

1. *K. carícina* (Compound-headed Kobrésia).—An unpretending little plant, with the habit of one of the lesser Sedges, or the short robust form of Sheep's Fescue grass. The *stem* is erect and rigid, from 6—12 inches high. The *spikelets*, each of which contains two flowers, are collected into four or five small spikes, and these are aggregated at the summit of the stem. The fertile flower contains one pistil with three stigmas; the barren, three stamens. The lowest bract is somewhat larger than the rest; the nut is obscurely triangular, and is included within the sheathing scale. The leaves are much shorter than the stem, tufted and curved. It grows, forming densely tufted masses, on moors in the North, and flowers in August. Some botanists describe it under the name of *Elýna carícina*. (Pl. 243, f. 1.)

11. Cárex (Sedge).

i. *Spikelet simple, solitary. Stigmas* 2.

* *Stamens and pistils on different plants.*

1. *C. dioíca* (Creeping Separate-headed Sedge).—*Fertile spikelet* egg-shaped; *glumes* obtuse; *fruit* ascending or horizontal (not deflexed); *barren spikelet* slender; *leaves* and *stem* smooth; *root* creeping. A slender plant, about 6 inches high, growing in spongy bogs, and flowering in May and June. Not common. (Pl. 249, f. 2.)

2. *C. Davalliána* (Prickly Separate-headed Sedge).—*Fruit* tapering to a point, rough, deflexed; *leaves* and *stem* rough; *root* tufted. Resembling the last, and



about the same size. It formerly grew at Lansdown near Bath, but is now extinct. (Pl. 243, f. 3.)

* * *Stamens and pistils in separate flowers on the same spikelet.*

3. *C. pulicáris* (Flea Sedge).—*Spikelet* slender, the upper half bearing stamens, the lower pistils; *fruit* tapering to a point at each end, glossy, at first erect, finally deflexed. A pretty little plant, from 6—10 inches high, common in bogs and moist moorland. The slender stem, scarcely thicker than a horsehair, bears from six to twelve shining brown seeds, which are distant from each other, and when ripe bear a strange resemblance to insects, clustering like aphides round the stem. The upper portion of the spikelet which bears the stamens remains unaltered. The leaves are tufted, long, and bristle-shaped. It flowers in May and June. (Pl. 243, f. 4.)

ii. *Spikelet simple, solitary. Stigmas* 3.

4. *C. rupéstris* (Rock Sedge).—*Spikelet* very slender, with the upper half barren, and a few fertile flowers at the base; *fruit* acutely triangular, erect; *leaves* flat, terminating in a long curling point. A very rare plant, from 3—6 inches high, growing on shelves of rocks in a few places in the Highlands, and flowering in August. (Pl. 243, f. 5.)

5. *C. pauciflóra* (Few-flowered Sedge).—*Spikelet* of from four to six flowers, the two upper barren; *fruit* tapering to a very long point, nearly cylindrical, deflexed; *leaves* flat, much shorter than the stem. Not unlike

C. pulicáris, from which, however, it may at once be distinguished by its much slenderer fruit, which is of a pale yellow colour, and by its shorter leaves. It is not unfrequent in the Highlands, where it grows in moory places, and has also been discovered in Northumberland. It flowers in June. (Pl. 243, f. 6.)

iii. *Spike compound, some flowers in each spikelet bearing stamens* (*barren*), *and some pistils* (*fertile*). *Stigmas* 2.

* *Spikelets crowded into a head.*

6. *C. incúrva* (Curved Sedge).—*Spikelets* barren above, fertile below, crowded into a roundish head. A well-marked species, inhabiting sandy sea-shores in the north of Scotland. The root, or rather underground stem, creeps extensively an inch or two beneath the surface of the sand, sending up, at intervals of two or three inches, one or more tufts of leaves and a head of flowers, which last, as it approaches maturity, bends down until it touches the sand. The true roots, which are long, fibrous, and tufted, issue from the main stem nearly opposite the leaves. The heads are large, but are rarely elevated more than two inches from the ground. Flowering in June. (Pl. 243, f. 7.)

* * *Spikelets alternate, barren at the base, fertile above.*

7. *C. ovális* (Oval-spiked Sedge).—*Spikelets* 5—6, oval, 1 terminal, the rest inserted, about half the length of a spikelet, one below another; *fruit* as long as the calyx, ovate, with a rough membranous margin tapering

to a point, which is 2-cleft. Common in marshy places. A somewhat slender plant with long grassy leaves, triangular stems, and brownish green shining spikelets, without conspicuous bracts. It flowers in June and July. (Pl. 243, f. 8.)

8. *C. stellulàta* (Little Prickly Sedge).—*Spikelets* 3—4, roundish, rather distant; *fruit* angular, with a long beak, rough at the margin, spreading when ripe. Marshy ground, common. A slender plant from 12—18 inches high, with long grassy leaves, well distinguished by its roundish spikelets of fruit, which grow about 7—8 together, each in the form of a star. It flowers in May and June. (Pl. 243, f. 9.)

9. *C. cùrta* (White Sedge).—*Spikelets* 5—6, rather distant, especially the lower ones; *fruit* elliptical, with a very short beak, about equal in length to the *glumes*. A slender plant from 12—18 inches high, having something of the habit of *C. ovàlis*. The *spikelets*, however, are not more than half as large, more distant; and the *glumes* are of a peculiar whitish hue, with green keels. It grows in bogs, but is rare, and flowers in June. (Pl. 243, f. 10.)

10. *C. leporìna* (Hare's-foot Sedge).—*Spikelets* 3, rarely 4, ovate, crowded; *fruit* elliptical, tapering to a point, equalling in length the ovate obtuse scales. A very rare plant, found in 1836 on the west side of Loch-na-gar, with a stem from 4—8 inches high, smooth and triangular. The *glumes* are reddish, with the margins paler; *fruit* yellow. (Pl. 243, f. 11.)

11. *C. elongàta* (Elongated Sedge).—*Spikelets* numerous, oblong, rather distant; *fruit* oblong, tapering to a

point, scarcely beaked, but bearing the persistent style, longer than the *glumes*. Marshes, rare, in the north of England. A stoutish plant 1—2 feet high, with acutely triangular stems, which are rough as well as the leaves. The *glumes* are brown, with a greenish keel and white edges. Upper *spikelets* crowded; lower, distant from one another about their own length. Flowering in June. (Pl. 243, f. 12.)

12. *C. remóta* (Distant-spiked Sedge).—*Spikelets* several, all single, approximate towards the top, but very distant below; *fruit* oblong, ovate, acute, the beak deeply 2-cleft; *bracts* very long, overtopping the stem. Moist places, common. A slender plant from a foot to a foot and a half high, with from 6—8 small pale green spikelets and very long narrow leafy bracts, the lowest of which overtops the stem several inches; the upper ones are gradually shorter. It flowers in June. (Pl. 243, f. 13.)

13 *C. axillâris* (Axillary-clustered Sedge).—*Spikelets* several. the upper ones single, close together, the lower in distant groups of two or more; *fruit* oblong, ovate, acute, the upper part serrated, the beak deeply 2-cleft; *bract* of the lower compound spikelet longer, the others shorter than the spikelets; *glumes* shorter than the fruit. Marshes. A rare species, well distinguished by the above characters from the foregoing, which it resembles in many respects. Flowers in June. (Pl. 244, f. 1.)

14. *C. Boenninghausiána* (Boenninghausen's Sedge). —*Spikelets* several, the upper ones simple, close together, the lower distant, compound; *fruit* narrow, tapering to a point, the upper part serrated; *bract* of the lower compound spikelet overtopping the stem; *glumes* equalling



NECTARY CLUSTERED CAPEA
Carex [illegible]

[illegible]ENGHAUSENIA
C. hexamuhlenbergiana

[illegible]AVE PANICLED
C. paniculata

[illegible]MADONICA
C. paradoxa

5. LESSER PANICLED
C. teretiuscula

6 GREAT
C. vulpina

7 GRAY
C. davalliana

8 GREATER PRICKLY
C. [illegible]

the fruit. Marshes, rare. Closely allied to the preceding. It flowers in June. (Pl. 244, f. 2.)

** * * Spikelets alternate, barren at their extremity, compound.*

15. *C. paniculáta* (Great Panicled Sedge).—*Spike* compound, consisting of numerous ovate stalked spikelets, which are themselves compound; *fruit* flat on one side, convex on the other, many-nerved, and ending in a winged triangular beak; *stem* rough, triangular, with flat sides. A common and picturesque plant, from 4—5 feet high, inhabiting spongy bogs, where it forms elevated tussacks or tufts after the habit of *Aira cæspitósa*, and is of much service in consolidating the soil. The *leaves* are long, broad, and very rough at the margins. It flowers in June. (Pl. 244, f. 3.)

16. *C. paradóxa* (Paradoxical Sedge.)—*Spike* compound, narrow; *fruit* much the same as in the preceding, except that the beak is not winged; *stem* rough above, triangular, with convex sides. Resembling the last in habit, but much smaller, being from 1—2 feet high, very rare, having been found only in two localities in Yorkshire and one near Mullingar. It flowers in July. (Pl. 244, f. 4.)

17. *C. teretiúscula* (Lesser Panicled Sedge).—*Spike* compound, oblong, consisting of numerous crowded spikelets; *fruit* resembling that of *C. paniculáta*; *stem* like that of *C. paradóxa*. Boggy meadows, rare. Resembling in many respects *C. paniculáta*, but very much smaller, and forming less decided tussacks. Boggy meadows; June. (Pl. 244, f. 5.)

18. *C. vulpína* (Great Sedge).—*Spike* cylindrical, consisting of numerous crowded compound spikelets; *fruit* large, terminating in a long rough beak; *stem* acutely triangular. Wet places, common. A robust plant 2—3 feet high, with broad leaves, which are so rough at the margins as to be dangerous to meddle with; the stem is equally rough, and terminates in heads of fruit, which, when ripe, point in all directions. It flowers in June. (Pl. 244, f. 6.)

* * * * *Spikelets alternate, barren at their extremity, simple.*

19. *C. divúlsa* (Grey Sedge).—*Spikelets* about 6, the lower ones distant; *lower bracts* rather longer than the spikelets, bristle-shaped; *fruit* large, pointed, roughish near the extremity. A slender species, with long narrow rough *leaves*, growing from 1—2 feet high, and remarkable for its greyish hue. Frequent in most shady places, and flowering in May and June. (Pl. 244, f. 7.)

20. *C. muricáta* (Greater Prickly Sedge).—*Spikelets* from 4—6, crowded; *bracts* nearly all shorter than the spikelets. Gravelly pastures, frequent. So closely resembling the last in all respects, that the two are very difficult of discrimination, if indeed they do not represent two forms of the same plant varied by soil, and situation. Flowering in May and June. (Pl. 244, f. 8.)

21. *C. arenária* (Sea Sedge).—*Spikelets* of three kinds, upper barren, lower fertile, intermediate ones barren at their extremities, forming an oblong, acute, interrupted head; *lower bracts* longer than the spikelets. A very distinct species, abundant on the sandy sea-shore,



1 SOFT BROWN CAREX
Carex intermedia

2 BRACTEATED MARSH C.
C. diversa

3 CLOSE HEADED ALPINE C.
C. vahlii

4 BOREY C.
C.

5 BLACK C.

6 COMMON C.
C. vulpina

7 RIGID C.
C. rigida

8 STRAIGHT LEAVED WATER C.
C. aquatilis

9 SLENDER SPIKED C.
C.

10 PUTTLE POG C.
C.

where it is of great service in preventing the shifting of the sands. The *roots*, or rather subterraneous stems, creep to a great distance a few inches below the surface. They are about as large as whipcord, and are invested with the remains of old leaf-sheaths, presenting a jointed appearance. From these, tufts of leaves and flowers arise at intervals of a few inches, and from the joints descend tufted fibrous roots, with here and there a stouter cord-like root which penetrates to a great depth; the *leaves* are rigid, rough at the edges, and of a glaucous hue; the *stems* are also rough above, and from 6—12 inches high, flowering in June. (Pl. 244, f. 9.)

22. *C. intermédia* (Soft Brown Sedge).—*Spike* composed of numerous ascending acute spikelets, of which the upper and lower are fertile, the middle barren; *lower bracts* longer than the spikelets. Marshes and wet meadows, common. Bearing in many respects a close resemblance to *C. arenária*, yet perfectly distinct: it attains double the height, the leaves are more grass-like, and the mature spike is singularly marked by being separated into two portions by the remains of the barren spikelets. Indeed, at all stages of its growth, the middle portion of the spike differs in appearance from the two extremities, by which peculiarity it may be distinguished from all other British Sedges. It flowers in June. (Pl. 245, f. 1.)

23. *C. divísa* (Bracteated Marsh Sedge).—*Spike* oblong ovate, composed of several spikelets, the lower one of which is furnished with a slender leaf-like *bract*. A slender plant about a foot high, with light green grass-like *leaves* and a creeping *root;* inhabiting marshy

places, especially near the sea, principally on the southern and eastern coasts, and flowering in May and June. (Pl. 245, f. 2.)

iv. *Terminal spikelet fertile above, barren below; the rest fertile. Stigmas* 3.

24. *C. Váhlii* (Close-headed Alpine Sedge).—*Spikelets* 3—4, clustering; *fruit* obovate, rough above, longer than the glumes. Very rare, on rocks in the Highlands, flowering in July. Well marked by its dark purple-brown spikelets, the lower ones of which are nearly round when in fruit, and accompanied by a short leafy bract; the upper spikelet is cylindrical and more pointed. The *stem*, which is triangular, is from 6—12 inches high. It flowers in July. (Pl. 245, f. 3.)

25. *C. canéscens* (Hoary Sedge).—*Spikelets* 3—5, sessile, except the lowest, which is stalked. A very rare species from 1—2 feet high, found only on a small island in Lough Neagh, Ireland, flowering in July. (Pl. 245, f. 5.)

26. *C. atráta* (Black Sedge).—*Spikelets* 3—4, ovate, stalked, finally drooping. A rare species, found on Snowdon and the Highland mountains. It attains the height of about a foot, and is remarkable for its unusually broad leaves, and the dark purple-brown hue of its glumes. It flowers in June. (Pl. 245, f. 5.)

v. *One (or sometimes two) terminal spikelets, barren; the rest fertile.*

* *Stigmas* 2.

27. *C. vulgáris* (Common Sedge).—*Spikelets* from 4—6, cylindrical; *bracts* leafy, dilated at the base, and forming

small round dark auricles; *glumes* obtuse, dark purple-brown; *fruit* elliptical, with a very short beak. Common in marshes and wet pastures, where it flowers in May and June, growing about a foot high, with a slender, acutely triangular *stem*, which is rough towards the top, *leaves* long and slender. (Pl. 245, f. 6.)

28. *C. rígida* (Rigid Sedge).—*Spikelets* oblong, 3—6; *lower bract* leafy, longer than its spikelet, with small round black auricles; *glumes* obtuse, black. On Snowdon and the Highland Mountains, from 4—6 inches high, forming numerous tufts of rigid acute *leaves*, which are as long as the *stem*. It flowers in June and July. (Pl. 245, f. 7.)

29. *C. aquátilis* (Straight-leaved Water Sedge).—*Spikelets* long and slender, tapering towards the base, and often having barren flowers at the extremities; *stem* smooth, usually triangular; *leaves* long and straight. Very rare. Bogs in the Clova mountains, where it flowers in July and August. (Pl. 245, f. 8.)

30. *C. acúta* (Slender-spiked Sedge).—*Spikelets* long and slender, the lower ones frequently barren at the top; *bracts* very long, leafy, frequently overtopping the stem; *auricles* lengthened, pale. A large species from 2—3 feet high, with broad flat *leaves*, which are inserted in three rows, and stout *stems*, which are acutely triangular and rough. The fertile spikelets are very long, and droop. Frequent in marshes and moist pastures, where it flowers in May. (Pl. 245, f. 9.)

31. *C. cæspitósa* (Tufted Bog Sedge).—*Spikelets* cylindrical, the lower ones often barren at the top; *lower bract* leafy, not longer than the spikelet; *auricles* long,

pale. Marshes, common. Approaching the last, but growing in more decided tufts; the *leaves*, too, are narrower, and have a glaucous hue. It grows from 2—3 feet high, and flowers in April and May. (Pl. 245, f. 10.)

32. *C. saxátilis* (Russet Sedge).—*Fertile spikelets* ovate, obtuse, the lower one stalked; *bracts* leafy; *fruit* inflated, spreading, beaked. A distinct species, well marked by the above characters, as well as by its triangular, pointed *leaves*, and very dark *fruit*. Rare, near springs on the Scottish mountains, where it attains the height of a foot or more, flowering in June. (Pl. 246, f. 1.)

** *Stigmas* 3; *fruit smooth; fertile spikelets short, sessile, or nearly so.*

33. *C. palléscens* (Pale Sedge).—*Fertile spikelets* oblong, the lowest stalked, slightly pendulous; *bracts* leafy, slightly sheathing at the base; *fruit* obovate, obtuse, tipped by the base of the withered style. A slender species, a foot or more high, well marked by its pale hue, and blunt fruit. Common in marshes, and flowering in June. (Pl. 246, f. 2.)

34. *C. exténsa* (Long-bracteated Sedge).—*Fertile spikelets* roundish, oblong; *glumes* terminating in a sharp point; *bracts* very long, leafy; *fruit* beaked; *leaves* very narrow. Marshes near the sea, rare. Devonshire, near Liverpool, and Ireland. (Pl. 246, f. 3.)

*** *Stigmas* 3; *fruit smooth; fertile spikelets stalked, erect.*

35. *C. fláva* (Yellow Sedge).—*Bracts* very long, leaf-like, sheathing the stalks of the fertile spikelets, and giving



1 RUSSET CAREX (
Carex [illegible]

2 PALE C.
C. pal[illegible]

3 LONG BRACTLEATED C.
C. [illegible]

4 YELLOW C.
C. [illegible]

5 TAWNY C.
C. [illegible]

6 LOOSE [illegible]
C. [illegible]

7 GREEN RIBBED C.
C. [illegible]

8 SMOOTH STALKED BLACK [illegible]
C. [illegible]

9 PENDULOUS C.
C. pendula

10 STOUT BROWN SPIKED C.
C. [illegible]

11 [illegible]

them the appearance of being sessile; *fertile spikelets* distant; *fruit* swollen, spreading, with a long recurved beak. Common in turfy bogs. A slender leafy species of a pale yellowish green hue, growing a foot high, and flowering in May and June. (Pl. 246, f. 4.)

36. *C. fúlva* (Tawny Sedge).—*Fertile spikelets* 1—3, oblong, ovate; *bracts* leafy, sheathing, not overtopping the barren spikelets; *glumes* acute; *fruit* erect, with a straight rough-edged beak; *stem* rough. A slender plant about a foot high, not unfrequent in boggy places, marked by its leafy stem, by the long sheath which accompanies the lower bract, and by its short spikelets. It flowers in June. (Pl. 246, f. 5.)

37. *C. dístans* (Loose Sedge).—*Fertile spikelets* 2—3, distant, oblong; *bracts* leafy, shining, not overtopping the barren spike; *glumes* terminating in a sudden sharp point; *fruit* equally ribbed on both sides, triangular, beaked. (Pl. 246, f. 6.)

38. *C. binérvis* (Green-ribbed Smooth-stalked Beaked Sedge).—Very like the last, except that the *fruit* has two principal green ribs on the outside. It is exceedingly difficult to discriminate between these two plants; if indeed they are not forms of the same. *C. dístans* varies in height from six inches to a foot, and grows in marshy places, mostly near the sea. *C. binérvis* is abundant on dry moors and mountainous woods, attaining a height of from 2—4 feet, and is remarkable for its slender *stems*, which frequently droop on all sides from the weight of the spikelets; the *glumes* of the fertile spikelets are of a dark purple hue, with a green midrib; the *leaves* are from 6—8 inches long, channelled.

rigid, and rough edged. Both plants flower about June. (Pl. 246, f. 7.)

39. *C. lævigáta* (Smooth-stalked Beaked Sedge).—*Fertile spikelets* 3 or 4, distant, on long stalks, the lower ones frequently drooping; *fruit* distinctly furrowed, tapering to a long smooth-edged beak; *bracts* leaf-like, sheathing. Moist woods, not common. Approaching *C. dístans* in habit, but well distinguished by the above characters as well as by its much longer and broader leaves. In Bickleigh Vale, Devon, the two species grow near each other, and retain their distinctive characters very decidedly. It flowers in June. (Pl. 246, f. 8.)

40. *C. panícea* (Pink-leaved Sedge).—*Fertile spikelets* two or three loose; *glumes* bluntish, with a green midrib; *bracts* leafy, sheathing, the lowest about as long as the spike, the rest shorter; *fruit* somewhat inflated, blunt. A distinct and very pretty plant, from 10—18 inches high, common in marshes and damp meadows, well marked by its foliage, resembling in hue that of the garden pink, its loose spikelets with purple glumes and green fruit, and the numerous yellow anthers of its barren spikelet. The *stems* are smooth and obtusely triangular. It flowers in June. (Pl. 246, f. 9.)

41. *C. vagináta* (Short Brown-spiked Sedge).—Resembling the last, except that the fruit is beaked. On the Highland mountains, rare; flowering in July. (Pl. 246, f. 10.)

42. *C. depauperáta* (Starved Wood Sedge).—*Fertile spikelets* 3 or 4, each containing about the same number of flowers; *bracts* leaf-like, very long; *fruit* large and


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terminating in a long beak. Dry woods, very rare. Godalming, Surrey; Charlton Wood, Kent, and near Forfar, where it flowers in May and June. A strongly marked species, with pale foliage and erect habit, the leaf-like bracts sometimes overtopping the slender terminal spikelet. (Pl. 246, f. 11.)

**** *Stigmas* 3; *fruit smooth; fertile spikelets stalked, drooping, short.*

43. *C. capilláris* (Dwarf Capillary Sedge).—*Spikelets* in long stalks, several sheathed by a common bract. A plant of humble growth from 2—6 inches high, bearing 3 or 4 few-flowered, slender spikelets, of which one is barren, in a kind of umbel. Highland mountains; flowering in June and July. (Pl. 247, f. 1.)

44. *C. rariflóra* (Loose-flowered Alpine Sedge.)—*Fertile spikelets* 2—3, slender, loose, few-flowered; *bracts* very short and narrow; *fruit* oblong, enfolded in the large blunt glumes. Bogs in the Scottish Highlands, rare, attaining the height of 8—10 inches, and flowering in June. (Pl. 247, f. 2.)

45. *C. limósa* (Mud Sedge).—*Fertile spikelets* 2, ovate, compact; *bracts* narrow, as long as the stalks of the fertile spikelets. Marshes in Scotland and the north of England. Remarkable for its large glumes and narrow long leaves, which nearly equal the stem in height, 10—12 inches. It flowers in June. (Pl. 247, f. 4.)

46. *C. ustuláta* (Scorched Alpine Sedge).—Resembling the last in some of the characters, but growing only a span high, and bearing broad short leaves. Ben Lawers, very rare; flowering in July. (Pl. 247, f. 4.)

***** *Stigmas* 3 ; *fruit smooth ; fertile spikelets stalked, drooping, long.*

47. *C. strigósa* (Loose Pendulous Sedge).—*Bracts* leafy, with long sheaths ; *fertile spikelets* slender, loose, slightly drooping ; *fruit* oblong, tapering ; *leaves* broad. Woods, rare. From $1\frac{1}{2}$—2 feet high; flowering in May and June. (Pl. 247, f. 5.)

48. *C. sylvática* (Pendulous Wood Sedge).—*Bracts* leafy, with sheaths not half so long as the stalks ; *fertile spikelets* slender, loose, pendulous ; *fruit* ovate, tapering into a long, cloven, smooth beak. Woods, common ; flowering in May and June. A tufted plant with slender stems, from 1—$1\frac{1}{2}$ feet high, bright green foliage, and loose spikelets, about half the length of the preceding, which are pendulous, on long, very slender stalks. "Linnæus tells us that this plant, when cured and dressed, is employed by the Laplanders to protect their feet from the cold."—*Sir W. J. Hooker.* (Pl. 247, f. 6.)

49. *C. péndula* (Great Pendulous Sedge).—*Bracts* leafy, with long sheaths nearly equalling the stalks ; *fertile spikelets* distant, very long, cylindrical. Damp woods and banks of canals. A tall plant 3—5 feet high, with a stem rough at the angles above, well distinguished by its very long pendulous spikelets, which often exceed 3 or 4 inches. It flowers in May and June. (Pl. 247, f. 7.)

50. *C. Pseudo-Cypérus.*—*Bracts* leaf-like, much overtopping the stem ; *fertile spikelets* cylindrical, on long stalks, somewhat crowded towards the top of the stem ; *glumes* bristly ; *fruit* terminating in a very long, spread-


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ing, deeply 2-cleft beak. Damp woods, rare. A very handsome and perfectly distinct species, from 2—3 feet high, with rough stems and leaves, and 5 or 6 fertile spikelets about 2 inches long, the fruit of which is so rigid as to be almost prickly. The terminal barren spike is occasionally fertile above. It flowers in June. (Pl. 247, f. 9.)

51. *C. glaúca* (Glaucous Heath Sedge). — *Bracts* leafy, scarcely sheathing; *fertile spikelets* 2 or 3, cylindrical, slightly drooping when in flower; *stalks* long, slender, and finally recurved; *fruit* broadly obovate, blunt, slightly downy at the point. Distinguished by its glaucous leaves (which somewhat resemble those of *C. panícea*), smooth triangular stem, densely flowered spikelets, and blunt fruit. There are often two barren spikelets. It grows, about a foot high, in damp meadows, and flowers in June; common. It was till recently called *C. recúrva*. (Pl. 247, f. 9.)

****** *Stigmas* 3; *fruit downy; fertile spikelets without stalks.*

52. *C. præcox* (Vernal Sedge).—*Fertile spikelets* 1—3, crowded, sessile; *lower bract* leafy, with very short sheaths; *glumes* broadly ovate, pointed; *fruit* ovate, obscurely triangular, acute. A humble plant from 3—8 inches high, common in dry pastures, where it makes itself conspicuous among the grass in early spring by its rather broad foliage and numerous yellow anthers. (Pl. 247, f. 10.)

53. *C. collína*. — *Fertile spikelets* 1 — 3, crowded, ovate, sessile; *bracts* short and narrow, with short mem-

branaceous sheaths; *fruit* oblong, very downy. Very rare, having been found only in Monmouthshire, Gloucestershire, and Sussex. It flowers in April and May, and grows from 4—7 inches high. (Pl. 248, f. 1.)

54. *C. pilulífera* (Round Headed Sedge).—*Fertile spikelets* 2—4, crowded, roundish, sessile; *bracts* short and narrow, without sheaths; *glumes* rigid and pointed; *fruit* nearly globose, acute. A common species with a very slender rough stem, bearing near the summit several short spikelets of few flowers; growing in wet moors, where it attains a height of 6—12 inches; flowering in June. (Pl. 248, f. 2.)

******* *Stigmas* 3; *fruit downy; fertile spikelets stalked.*

55. *C. clandestína* (Dwarf Silvery Sedge).—*Fertile spikelets* 1—3, each of about 3 flowers, which are concealed by the large membranaceous bracts. A humble plant from 2—3 inches high; the leaves are narrow and much longer than the stalks. It grows on Salisbury Plain and a few other places; but is rare. It flowers in May. (Pl. 248, f. 3.)

56. *C. digitáta* (Fingered Sedge).—*Fertile spikelets* 3—4, rather distant, slender, loosely flowered, the upper one longer than the terminal barren spikelet; *bracts* membranaceous, the lower one with a short leafy point. A slender and graceful plant from 8—10 inches high; the spikelets are remarkably lax, but the glumes and fruit are comparatively large. In limestone woods, very rare; flowering in May. (Pl. 248, f. 4.)

57. *C. tomentósa* (Large Downy-fruited Sedge).—*Fertile spikelets* about 2, nearly sessile, short, obtuse, with

acute glumes; *fruit* globose, densely downy, with a short beak. Meadows near Marston Maisey, Wiltshire; flowering in June. "A well-marked and very rare species, no other station being known for it in Britain than that just mentioned, whence I have an original specimen."—*Sir W. J. Hooker.* (Pl. 248, f. 5.)

vi. *Terminal spikelets barren, 2 or more; the rest fertile.*

Stigmas 3.

* *Fruit downy.*

58. *C. filiformis* (Slender-leaved Sedge).—*Fertile spikelets* 3 or 4, nearly sessile; *bracts* leafy, very narrow, much longer than their spikelets; *glumes* sharp-pointed. Boggy marshes, rare; flowering in May. A slender plant from 1—2 feet high, with long, very narrow, channelled, sheathing leaves; flowering in May. (Pl. 248, f. 6.)

59. *C. hirta* (Hairy Sedge).—Whole plant downy; *fertile spikelets* 2 or 3, remote, erect; *bracts* very long, leaf-like, with long sheaths. Marshes and damp woods, frequent. Much stouter than the last, and easily distinguished by its broad hairy leaves, and spikelets of large downy fruit. It flowers in May and June. (Pl. 248, f. 7.)

* * *Fruit smooth.*

60. *C. ampullácea* (Slender-beaked Bottle Sedge).—*Fertile spikelets* 2 or 3, remote, erect, shortly-stalked; *bracts* leaf-like, long, without sheaths; *fruit* inflated, beaked; *stem* smooth, with three rounded angles. Bogs and marshes, mostly in the north. Stem and leaves from

1—2 feet high. The leaves are channelled, glaucous, and rough at the edges. It flowers in June. (Pl. 248, f. 8.)

61. *C. vesicária* (Short-spiked Bladder Sedge).—*Fertile spikelets* 2 or 3, slightly drooping, nearly sessile; *bracts* long and leafy, without sheaths; *fruit* much inflated, beaked; *stem* rough, with 3 acute angles. Resembling the last, from which it is distinguished by the above characters, as well as by its broader green foliage, and much larger inflated fruit. Bogs and marshes, not common; flowering in June. (Pl. 248, f. 9.)

62. *C. paludósa* (Lesser Common Sedge).—*Fertile spikelets* cylindrical, slender, obtuse; *glumes* of the barren spike obtuse; *bracts* long and leafy, without sheaths; *fruit* oblong, tapering to a point. A tall plant from 2—3 feet high, with broad keeled leaves, which, as well as the stem, are rough. Common on the banks of rivers and canals; flowering in May. (Pl. 248, f. 10.)

63. *C. ripária* (Great Common Sedge).—*Fertile spikelets* somewhat crowded, broadly cylindrical, tapering to a point, which is often barren; *glumes* of the barren spikelet tapering to a long point; *bracts* long and broad, without sheaths; *fruit* oblong, tapering to a point. Taller and stouter than the last, with much broader leaves, which, as well as the stem, are rough. The stem is leafy, and the large dark brown spikelets are crowded towards the summit of the stem. Common on the banks of rivers and canals; flowering in May. (Pl. 248, f. 11.)

Order II. GRAMINEÆ.—GRASSES.

Flowers either with stamens and pistils, or with stamens or pistils only, sometimes neuter, that is, without either stamens or pistils, one, two, or more enclosed in *two* husks or valves, called glumes. In some cases the husk or glume is single; in some it is wholly wanting. The whole collection of flowers forms a spikelet. Each flower usually consists of two dissimilar valvelets called *glumellas*, of which the outer or lower is simple, and generally keeled, often armed with an awn; the inner has two nerves or keels. *Stamens* from 1—6 in number, most frequently 3, often accompanied by 2 or 3 scales, surrounding the germen; *anthers* notched at both ends. In the neuter flowers the glumellas are often rudimentary or wanting. *Germen* or *ovary*, 1-celled; *styles* 2, rarely 1 or 3. *Fruit* closely invested by the perianth or seed-vessel. When the spikelets are seated along a common stalk without any partial stalks, the mode of inflorescence is termed a spike, as in the Upright Sea Lyme-grass, Plate 269. When the spikelets all turn one way, it is a one-sided spike, as in the Mat-grass, Plate 250. When the spikelets are arranged on branches, it is a panicle; and this may either be spreading, as in the Quaking-grass, Plate 262, or it may be so close as to be spike-like, and is then a spiked panicle, as in the Vernal-grass, Plate 250; or the spikelets may be on undivided stalks, when it is racemed, as in Heath-grass, Plate 262. The stem of the grasses is often called a culm; it is cylindrical, or nearly so (never triangular), hollow and jointed, the joints becoming more distant at the upper part, with

a leaf at each joint, having a split sheath, and at the summit of the sheath often a membrane called a ligule. The rachis is that part of a stem which runs through the spike or panicle, and bears the flowers. The roots of Grasses are fibrous, the fibres often proceeding from underground stems, which are then called creeping roots; and in some cases Grasses are viviparous, forming buds between the leaf and stem.

* *Stamens* 2; *styles* 2

1. Anthoxánthum (Vernal-grass).—*Panicle* spiked; *glumes* 2, unequal, the upper longest, 3-nerved; each spikelet having 2 neuter awned florets, and one perfect floret without awns. Name from *anthos*, a flower, and *xanthos*, yellow.

** *Stamens* 3; *style and stigma* 1.

2. Nárdus (Mat-grass).—*Spike* bristly, straight; *spikelets* in two rows, without glumes; *glumellas* 2, outer one awned; *stigmas* thread-like, long, and protruding from the summit of the flower. Name from *nardos* of the Greeks, and formerly given to an odoriferous substance, though this grass is scentless.

*** *Stamens usually* 3, *rarely* 1.

† *Styles or stigmas* 2.

3. Leérsia (Cut-grass).—*Panicle* spreading; *spikelets* flattened, keeled, and awnless; *glumes* none; *glumellas* 2, lower one broadest; *stamens* usually 3. Named from John Daniel Leers, a German botanist.

4. Alopecúrus (Fox-tail).—*Panicle* spiked; *glumes* 2, usually connected at the base, about as long as the

floret; *glumella* 1, awned at the back. Name from *alópex*, a fox, and *oura*, a tail.

5. Phálaris (Canary-grass). — *Panicle* spiked or spreading; *glumes* 2, nearly equal, longer than the floret; *glumellas* 2, unequal, awnless. Named from *phalos*, shining.

6. Ammóphila (Sea-reed).—*Panicle* spiked; *spikelets* laterally flattened; *glumes* nearly equal, keeled; *glumellas* 2, each with a tuft of hairs at the base, outer one with a short awn. Named from *ammos*, sand, and *philos*, a lover.

7. Phléum (Cat's-tail-grass).—*Panicle* spiked; *glumes* nearly equal, longer than the floret, tapering to a fine point, or spine-tipped; *glumellas* 2, without awns. Named from *phleos* of the Greeks; this name having probably been applied by them to some other plant.

8. Lagúrus (Hare's-tail-grass).—*Panicle* spiked; *glumes* 1-flowered, rough, ending in a long bristle; outer *glumella* ending in two long bristles, and a twisted awn. Named from *lagos*, a hare, and *oura*, a tail.

9. Mílium (Millet-grass).—*Panicle* spreading; *spikelets* awnless; *glumellas* 2, nearly equal, and about as long as the glumes. Named from *mille*, a thousand, from its numerous seeds; or from *mil*, a stone, from their hardness.

10. Gastrídium (Nit-grass).—*Panicle* spiked; *glumes* 2, acute, awnless, swollen at the base; *glumellas* 2, lower one cut off suddenly, or toothed at the end, and with or without an awn. Named from *gastridion*, a little swelling.

11. Stípa (Feather-grass).—*Panicle* erect; *floret* stalked; *glumes* 2; outer *glumella* terminating in a very

long twisted awn. Named from *stipé*, flax, from its flaxen appearance.

12. Polypógon (Beard-grass).—*Panicle* compact and spike-like; *glumes* 2, equal, longer than the floret, each notched, and with a long straight awn at the end; *glumellas* unequal, the outer usually awned. Named from *polus*, much, and *pogon*, beard.

13. Calamagróstis (Small-reed).—*Panicle* loose or compact; *glumes* 2, nearly equal, longer than the floret, which is surrounded at its base by hairs; outer *glumella* usually awned. Named from *cálamos*, one of the Palms, and *agrostis*, a genus of Grasses.

14. Agróstis (Bent-grass).—*Panicle* loose; *glumes* 2, acute, awnless, longer than the florets; *floret* often with tufts of short hairs at the base; *glumellas* 2, unequal, the inner sometimes wanting, the outer with or without an awn. Named from *agros*, a field.

15. Catabrósa (Whorl-grass).—*Panicle* spreading; *spikelets* egg-shaped, awnless; *glumes* 2, shorter than the spikelets, very blunt, lower one much the smaller, upper one toothed at the end; *glumellas* 2, nearly equal. Named from *catabrósis*, a gnawing, from the jagged extremity of the glumes.

16. Áira (Hair-grass).—*Panicle* usually loose; *glumes* unequal, about as long as the florets, the outer 1-nerved; *glumellas* hairy at the base, the outer one awned. Named from *airo*, to destroy, anciently applied to the Darnel.

17. Molínia (Molinia).—*Panicle* more or less spreading; *spikelets* long and awnless; *glumes* 2, acute, shorter than the florets, unequal, 1-nerved; *glumellas* 2, outer

one rounded at the back, entire at the end. Named in honour of Molina, a Spanish botanist.

18. MÉLICA (Melic-grass).—*Panicle* loose; *spikelets* egg-shaped, awnless; *glumes* 2, nearly equal, shorter than the floret; *glumellas* 2, outer one rounded at the back, and entire at the end. Named from *mel*, honey.

19. HÓLCUS (Soft-grass).—*Panicle* loose; *spikelets* flattened, 2-flowered; *glumes* 2; *glumellas* 2. *Lower floret* with pistils and 3 stamens, its glumellas usually awnless; *upper floret* without pistils and with 3 stamens, with its outer glumella awned. Name *holcos* of the Greeks.

20. ARRHENATHÉRUM (Oat-like grass). — *Panicle* loose; *spikelets* flattened; *glumes* 2; nearly equal, as long as the floret; *lower floret* without pistils, but with 3 stamens, and its outer glumella with a long twisted awn. *Upper floret* with pistils and 3 stamens; *outer glumella* with a short bristle. Named from *arrhen*, male, and *ather*, an awn.

21. HIERÓCHLOE (Holy-grass).—*Panicle* loose; *spikelets* 3-flowered; *glumes* 2, nearly equal, about as long as the spikelet; *central floret* with pistils and 2 stamens *lateral florets* without pistils, and with 3 stamens. Named from *hieros*, sacred, and *chloe*, grass.

22. KOÉLERIA (Koeleria).—*Panicle* spiked; *spikelets* closely tiled all round, and with 2 or more perfect florets; *glumes* 2, somewhat unequal, keeled, and shorter than the florets; *glumellas* 2, outer one acutely pointed, or with a bristle near the end. Named from Köhler, a German botanist.

23. SESLÉRIA (Moor-grass).—*Panicle* spiked, with

spikelets closely arranged round it; *glumes* 2, unequal, nearly as long as the spikelet, with about two perfect flowers; *glumellas* 2, outer one keeled, and jagged at the end. Named after Sesler, an Italian botanist.

24. PÁNICUM (Panick-grass).—*Spikes* compound, with all the spikelets turning one way, 2-flowered, the lower floret either with stamens only, or without stamens or pistils; *glumes* 2, lower one small, upper one as long as the floret, and spine-tipped; *glumellas* 2. Named from *panis*, bread, the seeds of some species having been used for bread.

25. SETÁRIA (Bristle-grass).—*Spike* compound, cylindrical; *spikelets* 2-flowered, surrounded by an involucre of bristles; *lower floret* either with 3 stamens or neuter; *glumellas* of perfect floret 2, lower small, upper as long as the floret, imperfect floret with 1 glumella. Named from *seta*, a bristle.

26. PÓA (Meadow-grass).—*Panicle* loose or close, rarely a simple or compound spike; *spikelets* awnless, egg-shaped, or long, narrow, and flattened, with 3 or sometimes 2 perfect florets; *glumes* 2, unequal, and shorter than the florets; *glumellas* 2, outer rather blunt, and rarely tipped with a very small point. Name *Poa*, grass, from *pao*, to feed.

27. TRIÓDIA (Heath-grass).—*Panicle* with the spikelets on short, undivided stalks, flat, and 2—3 flowered; *glumes* 2, about as long as the florets; *glumellas* 2, outer one rounded on the back, notched, with a broad point, or awn from between the notches. Named from *treis*, three; and *odous*, a tooth.

28. BRÍZA (Quaking-grass).—*Panicle* much branched

and loose, with flat egg-shaped spikelets, their florets closely overlapping; *glumes* 2, broad, and much shorter than the spikelet; *glumellas* 2, awnless, outer one blunt, and with a chaffy margin, inner small and flat. Named from *britho*, to tremble.

29. Dáctylis (Cock's-foot grass).—*Panicle* with very crowded spikelets, rather turning one way; *spikelets* many-flowered; *glumes* 2, unequal, shorter than the spikelet, outer one keeled; *glumellas* 2, outer one with a short bristle. Named from *dactylos*, a finger.

30. Cynosúrus (Dog's-tail grass).—*Panicle* spiked, one-sided; *spikelets* each with a stiff involucre of fine segments at its base; *glumes* 2, equal, shorter than t spikelet, and shortly awned; *glumellas* 2, outer one awned, or spine-tipped. Named from *kyon*, a dog, and *oura*, a tail.

31. Festúca (Fescue-grass).—*Panicle* more or less loose; *spikelets* many-flowered; *glumes* 2, unequal, much shorter than the spikelet; *glumellas* 2; outer rounded at the back, taper-pointed or awned at or near the summit; inner with a minute fringe on the ribs; *styles* terminal. Name of uncertain origin.

32. Brómus (Brome-grass).—*Panicle* more or less loose; *spikelets* many-flowered; *glumes* unequal, of the same length as, or shorter than, the innermost florets; *glumellas* 2, outer one rounded on the back, with a long awn from below the tip; *styles* below the summit of the fruit. Name from *broma*, food.

33. Avéna (Oat).—*Panicle* loose; *spikelets* with 2 or more florets; *glumes* 2; *glumellas* 2, hairy at the base, outer one with a long twisted awn, having two

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points or bristles at the summit. Name of doubtful origin.

34. Phragmítes (Reed).—*Panicle* loose; *spikelets* many-flowered, the florets all enveloped in long silky hairs, which grow on the rachis of the spikelet; *glumes* 2, unequal, shorter than the floret, the lower much smaller; *glumellas* 2, the lower one with a long point at the end. Name, *phragmites*, an enclosure, from the uses of the reed.

35. Élymus (Lyme-grass).—*Flowers* in a spike; *spikelets* in pairs from the same point of the stem; *glumes* 2, both on one side of the spikelets without awns; *glumellas* 2. Name, from *elymos* of the Greeks.

36. Hórdeum (Barley).—*Spikelets* in threes from the same joint of the rachis, one or two usually with stamens only, or neuter; fertile spikelets with a perfect and a rudimentary neuter floret; *glumes* 2, ending with a long bristle; *glumellas* 2. Origin of name unknown.

37. Tríticum (Wheat, or Wheat-grass).—*Flowers* in a spike; *spikelets* solitary, many-flowered; *glumes* opposite, nearly equal; *glumellas* 2, outer taper-pointed or awned; inner cleft at the point. Name from *tritum*, beaten, or thrashed.

38. Brachypódium (False Brome-grass).—*Spikelets* solitary, alternate, many-flowered; *glumes* 2, opposite, unequal, shorter than the lowest floret; *glumellas* 2, bristled or awned at the extremity, inner one fringed on the ribs. Distinguished from *Tríticum* by the unequal glumes. Named from *brachus*, short, and *pous*, a foot.

39. Lólium (Darnel).—*Flowers* spiked; *spikelets*

solitary, alternate, with 3 or more perfect florets; *glumes* 1 or 2, the one next the rachis small; *glumellas* 2, outer one awnless, or awned. Name, the Lolium of the Romans.

40. LEPTÚRUS (Hard-grass)—*Spike* rounded, separating at the joints; *spikelets* solitary, and imbedded alternately on opposite sides of the rachis, with 1 perfect and 1 neuter floret; *glumes* 1 or 2, covering the floret; *glumellas* of the fertile floret 2, and awnless. Named from *leptos*, slender, and *oura*, a tail, from the slender spikes.

41. KNÁPPIA (Knappia).—*Spikelets* solitary, arranged in a somewhat 1-sided raceme, 1-flowered, awnless; *glumes* 2, opposite, blunt, not keeled, nearly equal; outer *glumella* hairy, jagged; inner sometimes wanting. Named after Mr. Knapp, an English botanist.

42. SPARTÍNA (Cord-grass).—*Spike* compound; *partial spikes* upright in a raceme, 1-flowered; *glumes* very unequal, upper taper-pointed; *glumellas* 2, taper-pointed; *styles* united half-way up; *stigmas* very long. Named from its similarity to *Lygeum Spartum*.

43. CÝNODON (Dog's-tooth grass).—*Spike* compound; *partial spikes* fingered; *spikelets* almost without stalks, awnless, arranged in one row on one side of the partial rachis, with one perfect and one neuter floret; *glumes* 2, spreading; *glumellas* 2. Named from *kyon*, a dog, and *odous*, a tooth.

44. DIGITÁRIA (Finger-grass).—*Spikes* compound; *partial spikes* fingered; *spikelets* in two rows on one side of a flattened rachis, awnless, with 1 perfect and 1 neuter floret; *glumes* 2, lower one minute, neuter floret

with one glumella resembling the upper glume. Named from *digitus*, a finger.

1. Anthoxánthum (Vernal-grass.)

1. *A. odorátum* (Sweet-scented Vernal-grass).—*Panicle* spiked, oblong; *glumes* about as long as the awns. Perennial. This grass may be known by its early flowering. By the middle of April, while as yet scarcely any grasses are in blossom, the compact panicle of this species may be seen on its slender stem, which is about a foot high, and accompanied by short, flat, rather light green leaves. It is very abundant in meadows, pastures, and on downs, growing often at a great elevation. It is a grass to which our summer hay-field owes much of its fragrance, for though other grasses contribute to this, in some degree, yet hay made from rye-grass, or other sown grasses in which this vernal species is wanting, has not the sweetness yielded so fully by this. Its glumes, as seen beneath the microscope, are copiously furnished with small glands, containing a fragrant essential oil. The scent of this grass is less powerful in its fresh, than in its dried state, but its pleasant flavour, reminding us of highly-scented tea, is perceptible to the taste at all stages of its growth. It grows in any soil or situation, becoming more luxuriant on moist land, and bearing, when growing in marshes, a large panicle. Though its amount of herbage is small, yet its readiness of growth renders it a useful pasture-grass; and its sweetness fits it for pleasure-grounds



1. SWEET SCENTED VERNAL GRASS.
 Anthoxanthum odoratum.
2. MAT G.
 Nardus stricta
3. MEADOW FOX TAIL G.
 Alopecurus pratensis.
4. ALPINE F T G.
 A. alpinus
5. SLENDER F. T. G.
 A. agrestis
6. TUBEROUS F T G.
 A. bulbosus.
7. FLOATING F T G.
 A. geniculatus
8. ORANGE SPIKED F T G.
 A. fulvus.

Professor Buckman remarks, that it is a most valuable grass to mingle with others, from the flavour which it imparts, but that it is too bitter to be greatly relished by cattle in continual use, and without the admixture of other grasses. Its leaves are apt in dry seasons to be blighted, and to assume an orange tint, and its stems, which do not seem to be eaten by cattle, wither early. The spike is by the middle of June of so bright a yellow as to have suggested the botanic name of the genus. (Plate 249, fig. 1.)

2. Nárdus (Mat-grass).

1. *N. stricta* (Mat-grass).—*Spike* erect, slender; the *spikelets* all pointing one way. Perennial. This is a rigid grass, growing in short tufts, and common everywhere on moors, heaths, and other dry places. It is five or six inches high, and bears in June its one-sided spike of flowers, which is often of a purplish or bronze colour, and armed with minute awns. The stems and leaves are slender, and hard, and too harsh to be much eaten by cattle; the matted tufts which it forms originated its familiar name. (Plate 249, fig. 2.)

3. Leérsia (Cut-grass).

1. *L. oryzoides* (European Cut-grass). — *Panicle* spreading with wavy branches; *spikelets* half-oval, with numerous delicate hairs at the back. Perennial. This rare grass was discovered a few years since by Mr.

Borrer, in ditches, brooks, and wet places, in some parts of Sussex and Hampshire. Its stem is one or two feet high, its leaves are broad and very rough at the edges, and it flowers from August to October. Mr. Babington remarks, "The panicle is rarely, if ever, protruded in this country, but is mostly included in the sheath of the uppermost leaf." It is a very common grass in America, and an exotic species of Cut-grass has its flowers so singularly constructed as to form a vegetable fly-trap to small insects.

4. Alopecúrus (Fox-tail.)

1. *A. praténsis* (Meadow Fox-tail).—*Stem* erect, smooth; *panicle* spiked, cylindrical, thick and blunt; *glumes* united at the base, and, as well as the *glumellas*, much fringed with fine hairs; *root* fibrous, and perennial. This tall grass, often two feet high, bears in May and June its yellowish green erect panicle, about two inches long, and covered with silvery hairs. It comes into flower next in succession to the Vernal-grass, and, like it, is very abundant, often constituting the chief part of the herbage of plains and meadows. It becomes most plentiful and luxuriant in marshy lands, where, by its numerous roots, it helps to drain and consolidate the soil. It often grows in salt marshes; and in moist places the base of the stem becomes so enlarged, that if this portion only of the plant were regarded, it might be mistaken for *A. bulbósus*, which, however, has a long slender spike tapering at both ends. It is a

most valuable grass for cattle, coming early, furnishing a large quantity of nutritive herbage, and yielding a better aftermath than almost any other grass. Its seeds are easily collected, but Mr. Purton remarks, that at least one-third of them are annually destroyed by a minute orange-coloured larva. Professor Buckman, who communicated the result of his experiments on grasses to the *Gardener's Chronicle*, remarks of this, that it might probably be profitably employed as a self-grass, especially in rich low-lands. "In such a situation," says this botanist, "at the foot of Silbury Hill, Wilts, during a visit in the first week in May, 1849, an unusually cold Spring, I walked through a field of this grass, which was being folded off by sheep, and a more luxuriant crop or better herbage I never remembered. It also does well where irrigation can be adopted, but it does not succeed well on the uplands. My garden specimens, however, yield an average crop, which endures cutting admirably, and throws up a tolerable second culmiferous and leafy growth." (Plate 249, fig. 3.)

2. *A. alpínus* (Alpine Fox-tail).—*Stem* erect above, slightly procumbent at the base; *panicle* spiked, oval; *awn* short; *upper leaf* short and broad, and its *sheath* swollen and very long; *root* creeping, and perennial. The stem of this grass is nearly a foot high, its leaves are broad and rough at the edges and inner surfaces. The panicle is short and blunt, rarely an inch in length, and very soft and silky, appearing in June and July. It is a mountain grass, growing at an elevation of 2,500—3,500 feet by the sides of streams, and on other marshy spots among the Clova mountains, and

at Loch-na-gar. Sheep eat its leaves, but it is not a valuable pasture-grass. (Plate 249, fig. 4.)

3. *A. agréstis* (Slender Fox-tail).—*Stem* erect, the upper part rough; *panicle* cylindrical, tapering to a point at both ends; *glumes* acute, united below; *glumella* smooth, with an awn more than twice its length; *root* fibrous, and annual. This grass, though considered as scarcely indigenous to Scotland, is common on road-sides in England, and often proves a troublesome weed to the farmer, by coming up early in Spring in wheat, clover, and other fields. John Ray called it Mousetail. It is readily distinguished in June and July by its slender spike, sometimes three inches long. The acute glumes are of a delicate sea-green colour, often tipped with purple. Its slender stem is one or two feet high, the leaves have a tendency to curl, and are frequently of a purplish-green hue. It thrives best on dry soils. Country people call it Black-bent. (Plate 249, fig. 5.(

4. *A. bulbósus* (Tuberous Fox-tail).—*Stem* erect, smooth; *panicle* spike-like, slender, taper-pointed, hairy; *glumes* acute, not united; *awn* twice as long as the glumella. Perennial. This is a rare plant, inhabiting wet salt marshes, and has been found near Yarmouth, and in Wales. The glumes on all the other British species are united at the base, but these, as may be seen by a magnifying glass, are entirely distinct. The stem of this Fox-tail is about a foot high, sometimes prostrate below, and the lowermost knots become large, oval, and fleshy tubers, generally of a rich purple colour. The dense panicle is dark green, about an inch long, and appears in July. (Plate 249, fig. 6.)



5. *A. geniculátus* (Floating Fox-tail).—*Stem* ascending, smooth, bent at the joints; *panicle* cylindrical, blunt; *glumes* united at the base, blunt. *Root* fibrous and slightly hairy; *awn* inserted at the base of the glumella. Perennial. The specific name of this plant points out a ready distinction, for the stem is always kneed, and sometimes the joints are enlarged and fleshy. The stem is about a foot long, branching below, and in July and August is terminated by the sea green panicle, delicately fringed, and one or two inches in length. The leaves are rather rough on both sides. It is not uncommon in marshy places, and though sometimes found in dry spots, is far more luxuriant in those which combine moisture and shade, where it attains sometimes the height of three feet. Its anthers are of a purplish-yellow colour. It is not a valuable grass to the agriculturist. (Plate 249, fig. 7.)

6. *A. fúlvus* (Orange-spiked Fox-tail).—*Stem* kneed at the joints; *panicle* spiked, cylindrical, blunt; *glumes* united at the base, slightly hairy. Perennial. The spike of this Fox-tail, which is two or three inches long, is conspicuous in July by its large orange-coloured anthers. The plant grows in ponds and ditches, but is local. Its stem is one or two feet in length, and bending below. This is closely allied to *A. geniculátus*, but the awn is much shorter, and the spike is more slender and of a lighter colour. (Plate 249, fig. 8.)

5. Phálaris (Canary-grass).

1. *P. Canariénsis* (Canary-grass).—*Panicle* large, spiked, erect, oval; *glumes* winged on the keel. Annual.

Stray speeimens of this handsome grass, naturalized on spots near to fields in which it has been cultivated, may often be gathered both in England and Seotland. We find it among our corn in July, or on some field border, its eonspieuous panicle growing on a sea-green stem, one or two feet high, and its leaves lance-shaped, rather long, broad, and soft. It has been cultivated in this country that its seeds may supply food for caged birds, since the time of Queen Elizabeth, and is believed to have been introdueed by the emigrants from the Netherlands. Large fields of it may yet be seen in some plaees, as about Deal, and in the Isle of Thanet, in Kent. The paniele is of a pale straw-eolour, the chaffy glumes edged and marked with green, and remarkably keeled at the back. (Plate 250, fig. 1.)

2. *P. arundinácea* (Reed Canary-grass).—*Panicle* ereet, with spreading branehes ; the *spikelets* numerous and crowded in a mass ; *glumes* not winged ; *root* ereeping and perennial. There is a variety of this plant, *variegata*, in whieh the leaves are striped with pale yellow or white. This grass is, in its general appearanee, altogether unlike the last, but is similar in the strueture of its florets. Its stem is sometimes five feet high, and its flowers are, in June and July, very eonspieuous by river sides, where it is not unfrequent, and where its pale-green or purplish panicle nods to the wind. In its early growth this is close, spreading only when nearly of its full length, which is about six inehes. The large roots ereep into the soft soil, rendering it firmer, and its broad long flat leaves are slightly rough on both sides. The variegated variety,

the Painted Grass, Ribbon Grass, or Gardeners' Garters, as it is commonly called, is to be found in almost every garden, where it is prized more for its foliage than for its flowers. Parkinson, who wrote his "Garden of Flowers" in the time of Charles II., concluded his work by a description of grasses, and tells his readers that he has led them through his gardens of pleasure, and showed them all the variety nursed therein, and adds: "I shall now, lastly, according to the use of our old ancient Fathers, bring you to rest on the grasse, which yet shall not be without some delight, and that not the least of all the rest." He says of the other grasses, "that they are known only to a few;" and very short is his own list of their number. This old writer, however, remarks of the Painted Grass, "The French call it *Aiguillettes d'Armes*, of the fashion that their ensigne's pennons or streamers used in wars were of, that is like unto a party-coloured curtain." He adds, that in England it is usually called Painted Grass, or Ladies' Laces, and that it had "long ago been respected and cherished in the country gardens of many gentlewomen." It is a favourite grass in Wales, and is often mingled with the Pearly Everlasting, a species of Cudweed, in ornamenting graves. (Plate 250, fig. 2.)

6. Ammóphila (Sea-reed).

1. *A. arundinácea* (Common Sea-reed).—*Panicle* close, cylindrical, tapering; *glumes* acute; *hairs* much shorter than the floret; *root* creeping, and perennial. This is the common Marum or Matweed of our sea-shores, and one of the most useful plants on the wide, dreary,

sandy flats so often seen there. It often grows in large masses, its numerous and strong roots, sometimes twenty feet long, serving to hold down those drifting sands, which else might rise in overwhelming heaps to desolate the neighbourhood, and which would prove as injurious as an overflow of ocean itself. Stillingfleet recommended that this grass should be sown on such sandy banks as were without it, and it has been extensively planted in Norfolk, and is carefully grown in Holland. Were it not for this plant and its allies, the Lyme-grass and the rough Sea-sedge, many parts of our coast would be exposed to the most alarming incursions of sand. It is not alone in countries like Egypt, where vast regions of sand prevail, that immense tracts of land have been covered by its inundations. Several instances have occurred in this kingdom of injuries done by them, as in the well-known one of the estate of Coubin, near Forres, in Scotland, where, in 1769, the encroachments of drifting sand had, in one season, completely buried this valuable property, so that only the upper part of an apple-tree was left visible. This calamity was caused entirely by the poor in the neighbourhood having pulled up the grass for household uses. In the reign of Queen Elizabeth an Act was passed to restrain this practice, and commanding that the growth of this Mat-grass should be encouraged. It has been planted in the Hebrides for preventing sand-drift, and its abundant growth on the large sand-bank called Spurn Point, is considered to have been the means of saving the town of Hull from having been washed away by the sea. Spurn Point, originally a drifting sand, has been ren-

dered firm in the course of years by successive growths of this bent; and on this sandy mass the ocean pours the violence of its first swell before it reaches the town. The sand-hills about Calais are held down in a similar way by a plentiful growth of this plant.

This sea-reed is abundant on many loose sandy shores of this kingdom, and on some of those of Kent we have, while looking at it in the morning, thought of the words of one of our oldest poets—

> "And now the dawn out of the Ocean's marge
> Began to peepe above the earthy masse,
> With early dew sprinkling the morning grasse."

The stem of this grass is three or four feet high, and its close panicle, tapering at both ends, is, in July, three or four inches in length; the foliage, which is very long, rigid, and of a sea-green tint, has not so bluish a hue as the other useful sand-plant, the Lyme-grass. Its creeping roots have little tubers like beads at the joints. This plant is never found on inland soils, and when by a succession of growths its masses have formed by their tough roots a firmer soil, the grass disappears. It has performed its service in the economy of nature, has bound the once shifting sands, and it gives way to plants of another character. Its coarse hard foliage is not relished by cattle, hence it is not cropped, and its tall greenish, straw-coloured, stiff stalks rustle to the winds of autumn, unless the poor people in the neighbourhood gather them for weaving into mats, or binding them into ropes for rustic uses. In the Hebrides it is manufactured into mats for pack-saddles, and into vessels for holding grain or meal. It is a source of great regret that in this country there are many hundred thousands of acres of

sea-sand, having all the advantages of climate and of the excellent manure afforded by the refuse of ocean, rendered useless by their want of solidity of soil, and yet too firm for the growth of Mat-grass. Various means have been suggested for rendering these sands useful to the agriculturist, and Dr. Paterson of Glasgow stated to the British Association in 1855, that he had seen a small sheltered corner, of which the soil was no better or other than that of a common sand-hill, which had been reclaimed from waste by the owner, and was then green with the waving produce of clover. In future days, therefore, means may be found of converting these tracts of sand into useful fields. (Plate 250, fig. 3.)

7. Phléum (Cat's-tail grass).

1. *P. praténse* (Common Cat's-tail).—*Panicle* cylindrical; *glumes*, as if cut off at the end, tipped with a spine, and fringed on the keel, longer than the awn; *root* perennial. This is one of the commonest of our meadow plants, growing well on dry poor soils, and retaining its verdure longer than most grasses. It becomes troublesome on dry gravelly soils, by means of its creeping roots, which in some situations become tuberous. This Cat's-tail is in this country used chiefly for hay, being a hard coarse grass, little relished by cows, horses, or sheep, but affording, if made into hay just when ripening its seeds, a fair supply of nutriment. It is in England sown with other grasses, but Professor Buckman says it is admirably adapted for a self-crop, and is one of the most commonly used grasses for this purpose in America, its herbage being in that land much coarser than in ours, and its stems often four feet high,

with flower-spikes four inches long. "In the States of New York and Pennsylvania," says this writer, "I saw hundreds of acres of the best cleared land occupied solely with this grass, of which, indeed, the great bulk of the grass hay of the country is made. Here so strong does it grow as at a slight distance to be capable of being mistaken for a grain crop." The grass grows slowly after cutting, and is late in ripening its seeds, hence its aftermath is not abundant, but its power of resisting drought induces this botanist to infer that it would be a good grass on dry upland or sandy soils. Hares are very fond of its herbage.

This Cat's-tail is from a foot to a foot and a half high, its leaves rather broad, rough, and furnished with long sheaths, and its panicle, which appears in June, is from two to four inches long, varied with green and white. It owes its common name of Timothy-grass to Mr. Timothy Hanson, who cultivated it extensively in America. (Plate 250, fig. 4.)

2. *P. alpínum* (Alpine Cat's-tail.)—*Panicle* egg-shaped, somewhat oblong; *glumes* fringed at the back, cut off suddenly at the end, shortly bristled, sheath of the upper leaf very long and swollen. This rare grass is found on the banks of streams, on Scottish mountains. It has a very short bristly panicle, rarely exceeding an inch in length, of a purplish brown colour, and a creeping knotted perennial root. It varies in the degree in which its leaf-sheath is inflated, as well as in the roughness of its awn. (Plate 250, fig. 5.)

3. *P. ásperum* (Rough Cat's-tail).—*Panicle* cylindrical; *glumes* wedge-shaped, swelling upwards, rough. Annual.

This is a rare grass of dry open fields in some parts of England. Its stem is about a foot high, often branched, and in July its leaves are so long and numerous that they almost cover the flower. The panicle is about two inches long. It has been found in fields about Bristol, and in other parts of Gloucestershire. (Plate 250, fig. 6.)

4. *P. Bæhméri* (Purple-stalked Cat's-tail).—*Panicle* cylindrical; *glumes* narrow, pointed, spine-tipped, and downy at the keel. Perennial. This rare grass grows chiefly on dry sandy or chalky fields in Norfolk and Cambridgeshire. It has a glossy purple unbranched stem, erect, and about a foot high, and but few leaves. It flowers in July. The glumes are purplish. (Plate 250, fig. 7.)

5. *P. Michélii* (Michelian Cat's-tail).—*Panicle* hairy, cylindrical; *glumes* tapering to a point, with a fringed keel. Perennial. This is probably not an indigenous grass. It was stated to be found on the rocky parts of the Clova mountains by Mr. Don, but as it is not found there now, some mistake is supposed to have occurred. (Plate 250, fig. 8.)

6. *P. arenárium* (Sea-side Cat's-tail).—*Panicle* oblong, enlarged at the top; *glumes* tapering to a point, fringed on the keel. Perennial. This is one of our sand grasses, of which we have no fewer than seventeen, all more or less useful in binding the sands. It grows more frequently on the sea-shores of Scotland than England, and though its stem varies in height it is most frequently about half a foot, several stems rising from one root. Its short crowded oblong panicle is of yellowish green, often tinged with a little pinkish colour. It will grow only on



1 OVATE HARES TAIL GRASS
Lagurus ovatus

2 SPREADING MILLET G
Milium effusum

3 AWNED NET G
Gastridium lendigerum

4 COMMON FEATHER G
Stipa pennata

5 ANNUAL BEARD G
Polypogon monspe[illegible]

6 PERENNIAL B G
Phleum alpinum

loose sands, and is there a straw-coloured bright glossy grass in June and July, and, like our sand-grasses in general, of no use to the agriculturist. (Plate 250, fig. 9.)

8. Lagúrus (Hare's-tail grass).

1. *L. ovátus* (Ovate Hare's-tail grass).—*Spikes* egg-shaped, with long awns projecting from among the down. Annual. This is a rare grass, inhabiting sandy places in Guernsey, but occasionally planted in tufts in English gardens. It is from four to twelve inches high, with broad leaves and a soft downy panicle of pale greyish colour, slightly tinged with pink. (Plate 251, fig. 1.)

9. Mílium (Millet-grass).

1. *M. effúsum* (Spreading Millet-grass).—Branches of the *panicle* long, and in distant tufts, placed alternately on the stem. Perennial. This is a tall slender grass, conspicuous in our moist shady woods, where it is often very abundant, its stem rising to the height of four feet, and its broad smooth leaves of a delicate bright green colour. In June it bears numerous very small light green spikelets, the middle branches of the panicle drooping. It is a very elegant grass, and in winter its tall slender stems and branches, turned to a pale straw-colour, often occupy a large space of ground when flowers have faded away from the wood. The grass is not a nutritious one for cattle, but birds eat the seeds. (Plate 251, fig. 2.)

10. Gastrídium (Nit-grass).

1. *G. lendígerum* (Awned Nit-grass).—*Panicle* spiked, *glumes* tapering to a point, shorter than the awn of the

glumella. Perennial. This little grass, which varies in height from four to eight inches, bears in August a close panicle of numerous pale yellowish green glossy florets, much swollen at the base, and their form affords a ready means of identifying the plant. It is a rare grass, growing in the maritime counties, as Cornwall and the Isle of Wight, generally in places where water has stood during winter. (Plate 251, fig. 3.)

11. Stípa (Feather-grass.)

1. *S. pennáta* (Common Feather-grass).—*Awns* very long, fringed throughout their length ; *leaves* rigid and bristle-like. Perennial. This is included in our list of British grasses, because it is said to have grown, in the time of Dillenius, on rocks near Kendal in Westmoreland. Most persons are familiar with it as a garden ornament in summer, its long feathery tufts, so like the tail feather of a Bird of Paradise, growing two or three feet high. It forms a beautiful addition to the winter bouquet of "Everlastings," so frequent on mantelpieces, and when soiled with dust will bear cleaning with soap and water, though the long awns are too fragile for a frequent repetition of the process. Gerarde mentions that this grass was in his time worn in the hair instead of feathers; and Parkinson, writing somewhat later, refers to its use as an ornament by ladies, after recent illness. "I have knowne," he says, "that many gentlewomen have used it, being tyed in tufts to set them about their beds, which have been much admired of the ladies and gentlemen that have come to visit them." The grass is a native of dry rocky and sandy spots in the south


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of Europe, and is very common in Austria. It is easy of cultivation, provided that the seeds are sown soon after they are ripe. (Plate 251, fig. 4.)

12. Polypógon (Beard-grass).

1. *P. Monspéliensis* (Annual Beard-grass).—*Panicle* crowded and spike-like; *awns* remarkably long; *glumes* rough and blunt. Annual. This light and elegant grass is found only in a few moist meadows near the sea, in Hampshire, Essex, and some other counties. Its dense silky panicle is, in July and August, beautifully tinted with different shades of green and pale greyish purple, and is one or two inches long, on a stem about a foot high. It has slender hairy leaves, and is a very common grass in southern Europe. (Plate 251, fig. 5.)

2. *P. littorális* (Perennial Beard-grass).—*Glumes* smooth, tapering to a point, and with *awns* about their length. This, too, is a rare grass, occurring in muddy salt marshes, as in those near Woolwich, and on the coast of Essex. Its stem is about a foot high, and it bears in July its close purplish panicle. Its leaves are somewhat broader than those of the last species, and of bright green, and it has a creeping root. (Plate 251, fig. 6.)

13. Calamagróstis (Small-reed).

1. *C. Epigéjos* (Wood Small-reed).—*Panicle* upright; *spikelets* crowded; *glumes* awl-shaped, rough; *awn* of outer *glumella* nearly as long as the glume; *hairs* much longer than the awn. Perennial. This is a handsome,

though rigid plant, with a round erect stem, sometimes five feet high ; and narrow acute leaves, hairy on the inner, and smooth on the outer sides. The green one-sided panicle is more or less tinted with brown, with silky hairs, and about half a foot long ; flowering in July. This reed is not common, but grows in moist shady woods in some parts of Kent, and about London, as well as in some other places both in England and Scotland. It is far too harsh a grass to be touched by cattle. (Plate 252, fig. 1.)

2. *C. lanceoláta* (Purple-flowered Small-reed).—*Panicle* erect, loose ; *glumes* smooth ; *awn* short from the notch in the *glumella; hairs* long. Perennial. This grass, with its slender stem three or four feet high, and graceful silky panicle, with an abundance of scattered spikelets, is far more common than the last, and in moist hedges often towers above the bushes, its glossy cluster of flowers being, in June, of a rich purple hue, much smaller, but much prettier in colour than that of the last species. It is somewhat local, but the author has found it in woods near Hythe in Kent, growing to the height of five feet. (Plate 252, fig. 2.)

3. *C. stricta* (Narrow Small-reed).—*Panicle* erect, close ; *glumes* acute, rough on the keel ; *glumellas* as long as the glumes, longer than the hairs ; *awn* straight. Perennial. This reed is the smallest of the species, and has an upright stem two or three feet high ; bearing, in June, a close panicle of many spikelets, about three inches long, and tinged with purplish-blue colour. Its leaves are broad and rigid. It is a very rare plant, inhabiting bogs and marshes, and is readily distin-


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guished from the other species by its general appearance, and the colour of its flowering clusters. (Plate 252, fig. 3.)

14. Agróstis (Bent-grass).

1. *A. canína* (Brown Bent-grass).—Branches of the *panicle* long, slender, spreading, when in full flower, and erect; *glumes* unequal, rough at the keel; *glumella* single, toothed, awned from below the middle. Perennial. This is a very abundant grass on boggy meadows, and one often gathered for its delicate beauty. Its glossy stem is one or two feet high, prostrate below; and in June and July its airy clusters, formed of numerous small spikelets on thread-like branches, vary in tint, from pale yellowish-green, to every hue of purple. It generally grows about the moors in little patches, and it has a creeping tufted root, and roughish leaves. (Plate 253, fig. 1.)

2. *A. setácea* (Bristle-leaved Bent-grass).—*Panicle* close, oblong; *branches* and *flower-stalks* rough; *glumes* unequal; outer *glumella* toothed with an awn twice its length. Perennial. This is a plant almost confined, in this country, to downs at the south and south-west of England. It has numerous rigid bright green leaves growing in tufts from the root; and bears, in June and July, numerous oblong panicles with short branches. It is said that no grass is pleasanter to the feet than this, and that the large natural downs which are composed of its turf, in Devonshire, are as neat as the best kept lawns. They need no mower's hand to keep them so; nor, indeed, would these rigid leaves and stems yield to the scythe. On the open downs of Cornwall,

this grass, dwarf furze, and heather, constitute the principal vegetation. (Plate 253, fig. 2.)

3. *A. vulgáris* (Fine Bent-grass).—*Panicle* spreading, its branches almost smooth; *glumes* nearly equal; *glumellas* thin and unequal; *root* creeping and perennial; *spikelets*, in one variety awned, in another awnless. There is also a dwarf variety of this plant, not more than three inches high. This Bent is very common in every part of the kingdom; in meadows and pastures, and by road-sides; at the base of walls, or on other dry spots, often growing in great plenty. Its slender stem is a foot and a half high; and it bears, in June and July, clusters of numerous purplish spikelets, so delicate, and on branches so hair-like, that they quiver in every summer breeze. The small quantity of slender herbage which this grass produces is in perfection by the middle of April, and supplies a good, though slight pasture for cattle. The grass is often called Black Quitch. (Plate 253, fig. 3.)

4. *A. álba* (Marsh Bent-grass).—Branches of the *panicle* spreading when in flower, afterwards compact; *glumes* nearly equal; *stems* erect, but somewhat prostrate at the base; and in the variety called *stolonífera*, rooting, and throwing out long runners. A variety termed *marítima* has trailing stems, rooting at the knots, and a small lobed panicle. This is a perennial, and very common grass, stouter and taller than the preceding, growing abundantly in meadows, on sunny slopes, and by road-sides, being in leaf early in May, or, in forward springs, during April. It is a remarkably fertile plant, producing a large number of suckers; and it affords



1 MARSH BENT GRASS.
Agrostis alba

2 SPREADING SILKY BENT GRASS.
Vespicaverti

3 DENSE FLOWERED SILKY BENT GRASS.
Vinterrupta

4 WHORL
Calabro

an excellent pasture for sheep. The short, flat, narrow, and acute leaves are rough on both sides; and its flowers, which appear in July and August, are sometimes of a paler yellowish-green than those of most of the species, but are quite as often of a purplish colour; the stalk is frequently a foot and a half or two feet high, though few grasses vary more on different soils. (Plate 254, fig. 1.)

5. *A. Spíca-vénti* (Spreading Silky Bent).—*Panicle* loosely spreading; *glumes* unequal; *awn* straight, very stiff, and three or four times the length of the glumella. Annual. Slender and delicate as are all the species of *Agrostis*, and remarkable for their small spikelets, yet none are graceful and airy like this. The light and elegant panicle is often six inches long, and of pale green, but sometimes of pinkish hue, leaning on one side, and glossy as satin, nodding to every breath of the midsummer wind which sweeps across the sandy fields where it grows. Its rough and slender awns are many times as long as the spikelet. It is a rare grass, and found chiefly in the neighbourhood of London. On spots occasionally inundated it becomes very luxuriant, its stem rising to the height of three feet, though, usually, about one or two feet only. Its long awns would prevent its being mistaken for any other grass except the following. The inner glumella contains a small neuter floret, with a tuft of hairs at its base. (Plate 254, fig. 2.)

6. *A. interrúpta* (Dense-flowered Silky Bent).—*Panicle* close, long, slender; *glumes* unequal; *glumellas* with straight long awns. Annual. This grass differs

from the last in its close, never-spreading panicle; and in the more rounded form of its anthers; but it resembles it in structure in other respects. It flowers in July, and its stem is rarely more than half a foot in height. (Plate 254, fig. 3.)

15. Catabrósa (Whorl-grass).

1. *C. aquática* (Water Whorl-grass).—*Panicle* with half whorls of spreading branches; spikelets usually with two, sometimes 3—5 florets; *glumes* thin and blunt; *glumellas* thick, white, and clear at the extremity. Perennial. This is an aquatic grass, sometimes floating to a great length in the water, at others, growing on wet banks, when it becomes much smaller, and has a stem but a few inches high. The panicle of this Whorl-grass is composed of a large number of small spikelets, bluish, or often brownish green on very slender branchlets; the stem is stout, and one or two feet long, bending at the base, and sending out roots. The leaves are broad, blunt, and bright green; and the flowers, which appear in May and June, have a sweet flavour; the whole plant having more or less of a sweetish taste. Water-fowls are fond of its young leaves and shoots, while cattle relish it so much, that were the grass not an aquatic, it would doubtless be cultivated for their pasturage. It is said to contribute to the excellence of the Cambridge butter and the Cottenham cheese. Curtis remarks of it, that no less than five species of flies (*muscæ*) were produced from a few handfuls of its seeds, among which they had, no doubt, hybernated in the chrysalis state. (Plate 254, fig. 4.)


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16. Áira (Hair-grass).

1. *A. cæspitósa* (Tufted Hair-grass).—*Panicle* spreading, branches rough; *glumes* slightly rough at the midrib; *awn* inserted near the base of the outer glumella, and scarcely extending beyond its summit. There is a variety of this grass, *brevifolia*, with short leaves and smaller panicle; and another with longer awns, termed *longi aristata*. This is a common and very pretty grass, with a perennial root; and it is found in abundance on field-borders, and especially on moist moory ground, where it flowers, in June and July, among Spearworts and other marsh flowers, and thick green mosses. On such spots, especially if shaded by furze and brambles, it attains great luxuriance; but when the land is drained, it soon disappears; and when we see it, as we often do, growing with the different species of Sedge (Carex), and with the roughish Meadow-grass, we have sure indication that the land is not in good condition. It is commonly known in country places by the name of Hassock or Tussack-grass; and its large matted tufts cause those clumps called tussacks, which the mower finds so great a hindrance to his scythe. It is also termed Rough-caps, from its long, narrow, rough, twisting leaves, which are marked with fine lines. Bull-faces and Silver-grass are also among its familiar names.

This Hair-grass has a strong stiff stem, two or three feet high, and its light and graceful panicle is of a dull metallic hue, but when glistening in the midsummer sunshine, its numerous small spikelets look as if cut out of silver. It is a hard rigid grass, and is refused by

horses, while cows will only eat it when compelled by hunger. (Pl. 255, fig. 1.)

2. *A. alpína* (Smooth Alpine Hair-grass).—*Panicle* close; *glumes* smooth on the midrib; *awn* from about the middle of the glumella, and scarcely longer than the glumes. Perennial. This, which is usually a viviparous grass, grows abundantly on the mountains of Scotland and Wales, on moist rocks. It has a glossy stem, a foot or a foot and a half high, its leaves are rough within and smooth on the outer surface, and often turning backwards. The panicle, which appears in June and July, is very light, slightly drooping, and composed of numerous pale brown shining spikelets, on nearly erect branches. (Pl. 255, fig. 2.)

3. *A. flexuósa* (Wavy Hair-grass).—*Panicle* spreading, with wavy branches; *awn* inserted near the base of the glumella, and extending far beyond it; *florets* hairy at the base, as long as the glumes. Perennial. This grass has a slender erect smooth stem, a foot or a foot and a half high, and bears, in July, a pale greenish-brown, glossy, erect panicle. The spikelets are much larger than in the preceding species, and the wavy angular branches are not thicker than the most delicate sewing-thread. It grows abundantly on hill sides and heathy places, and has long, slender, bristle-like leaves. (Pl. 255, fig. 3.)

4. *A. canéscens* (Grey Hair-grass).—*Panicle* long and crowded; *glumes* taper-pointed, longer than the florets; *awn* short, club-shaped, from near the base of the glumella. Perennial. The tufted stem of this grass is six or eight inches high, and bears, in July, a panicle of numerous spikelets, variegated with purple, green, and


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white, the awns being purplish-white, and the anthers purple. Its leaves are numerous and bristle-like. It is a very rare grass, found on the sandy sea-coasts of Dorset, Norfolk, and Suffolk, and it has also been gathered from the chalk between Folkestone and Dover, in Kent. (Pl. 256, fig. 1.)

5. *A. caryophyllea* (Silvery Hair-grass).—*Panicle* spreading, three-forked; *spikelets* blunt at the base; *glumes* nearly equal, rounded at the base, the upper part clear and white; *awn* longer than the glumes; outer *glumella* deeply cleft. Perennial. This is a frequent grass on gravelly heaths and pastures, its stem sometimes not more than two or three inches, and rarely a foot high. It has a few short bristle-like leaves at its root, and several small rough ones on its stem. It flowers in June and July. Its panicle is of a silvery grey colour, and the spikelets are very small. (Pl. 256, fig. 2.)

6. *A. præcox* (Early Hair-grass).—*Panicle* spike-like, oblong; *awn* much longer than the cleft glumella, and from below its middle. Annual. This little grass, inhabiting sandy hills and pastures, is rarely more than three or four inches high. Its panicle, which appears in May and June, is very small, erect, and close, and has few spikelets, often not more than a dozen. They are yellowish or purplish green, somewhat tinged with silver colour, but less so than most of the species, and they are rather pointed at the lower end. The florets have scarcely any hairs at the base. The leaves are few, slender, and bristle-like. In dry seasons it withers very early. (Pl. 256, fig. 3.)

17. Molínia (Molinia).

1. *M. cærúlea* (Purple Molinia).—*Panicle* erect, narrow; *spikelets* erect, oblong, narrow; *floret* much longer than the *glume*. Perennial. This grass flowers in August and September, later than almost any other, and is common on heaths and moory grounds. Its stem is usually one or two feet high, and has a single joint near its base, but grows much taller when sheltered by the furze-bushes or ling of the moist moor. The panicle is of a much deeper hue than any other of our native grasses; for although a variety found at a great elevation on the Clova mountains, and called *depauperata*, has numerous, pale green, one-flowered spikelets, yet our grass has usually a tint as deep as that of the myrtle leaf, with a dark tinge of bluish-purple spread over it, and large purple anthers. Its spikelets are small but numerous, two or three flowered, and the panicle is from three to six inches long, with numerous waved branches. The leaves grow either from the root, or rise from the knot at the lower part of the stem, and are long, slender, and taper-pointed. The long straws of this grass are said by Withering to be made, in country places, into carpet-brushes, and twisted together they form a durable line used by fishermen. The root has large thick fibres. (Pl. 256, fig. 4.)

18. Mélica (Melic-grass).

1. *M. nútans* (Mountain Melic-grass).—*Panicle* almost a raceme; its *spikelets* large, hanging on short stalks, which are rarely branched, from one side of the



1 CREEPING SOFT GRASS
Holcus mollis

2 MEADOW S G
H lanatus

3 COMMON OAT GRASS
Arrhenatherum avenaceum

4 NOLTHERN BROY G
Bromoides boreales

5 CROWN D ROLLERA
Lolium

stem, oval, and with two perfect flowers; *glumes* oval; *glumellas* unequal. Perennial. This grass has many long, thin, bright shining leaves, and a stem about a foot high. Its flowers appear in May and June; their glumes are of a purplish-brown colour, with a white margin. It is found in shady places and woods in hilly and mountainous countries, and is frequent in the neighbourhood of Malvern. Cattle do not relish it. (Pl. 256, fig. 5.)

2. *M. uniflóra* (Wood Melic-grass). — *Panicle* branched, slightly drooping; *spikelets* erect, oval, and with only one perfect floret; *root* creeping and perennial. This is one of our most common vernal grasses, nodding to the breeze of May, beside the primroses and blue-bells. It is very abundant in some woods; and its large spikelets standing on a slender stem, a foot or more high, and each on a hair-like stalk, would hardly fail to be noticed by any lover of flowers. The spikelets are few, and distant from each other, erect, and of a purplish-brown hue, variegated with white and green. Cattle relish the soft, drooping, bright green leaves, which are marked on both sides with lines. It flowers early in summer, but the glumes retain their form long after the seed is shed. (Pl. 256, fig. 6.)

19. Hólcus (Soft-grass).

1. *H. móllis* (Creeping Soft-grass).—*Panicle* loose; *glumes* tapering to a point; *awn* rough; joints of the *stem* hairy. Perennial. This grass, owing to its long, creeping, knotted root, is very difficult of extirpation, and when it grows, as it often does, in corn-fields, it is

very troublesome. Mr. Loudon remarks of it, that it is the true couch-grass of light sandy soils; and long runners, which were but the result of a few months' growth, have been found extending themselves five feet beneath the surface of the soil. It grows in uncultivated fields and thickets, and is very common by roadsides, but is rarely a meadow-grass. It bears, in July, a light and elegant erect panicle, of numerous small spikelets, which is much like that of the next species, but not so ornamental, being rarely tinged with pink, and mostly of a dull greenish-white hue. Its stem is from one to three feet high; its leaves lance-shaped, rather broad, and light green; and the knots of its stem usually woolly. The root shoots are very nutritious, and when taken up are readily eaten by cattle; but the dry, soft, insipid herbage is little relished by them. (Pl. 257, fig. 1.)

2. *H. lanátus* (Meadow Soft-grass).—*Panicle* loose; *glumes* rather blunt, spine-tipped; *awn* smooth, except near the extremity. Perennial. We have only to walk abroad during June and July into the wide-spread meadow-lands, and we shall be sure to see this grass. It grows on all soils, from the richest to the poorest, but its prevalence always indicates a poor and moist meadow. Its beautiful soft panicle, composed of innumerable small spikelets, crowded together, tinged with pink, often deepened into rich pinkish-purple, is large and conspicuous, though its brightness disappears as the grass gets older. It then, if abundant, whitens the pasture, so as to deserve its old name of Yorkshire Whites, or even of Yorkshire Fog. It is not unlikely,

however, that it owes its latter name to its softness, which led to its comparison with moss, for which fog was an olden name, and by which it is yet called by North country people, who allude to moss in their familiar proverb :—

"The ro'ing stane gathers nae fog."

Our Meadow Soft-grass is one or two feet high, and has a fibrous root. Curtis says of it, that when it is in flower the farmer thinks his grass-land fit for the scythe. The herbage, as well as the flowers, is covered with soft down. It is not sufficiently succulent to be liked by cattle, and both leaves and flowers often remain untouched on meads when other grasses have been cropped all around them. Its nutritious properties are said to consist of mucilage and sugar; but it would appear that the properties most relished by our herbivorous animals are either sub-acid or saline. (Pl. 257, fig. 2.)

20. ARRHENATHÉRUM (Oat-like grass).

1. *A. avenáceum* (Common Oat-like grass).—*Panicle* long and loose; *root* fibrous and perennial. A variety of this grass, *bulbósum*, has a swollen or tuberous base to the stem, and is commonly called Onion Couch. The Oat-like grass is, during June and July, a tall conspicuous plant; its panicle, composed of rather large spikelets on slender branches, is often a foot and a half long, of a bright brown, or so tinted with shades of green and lilac as to shine in the sunshine as if with metallic lustre. This grass is sometimes five or six feet in height, and it is as common as it is beautiful, for it nods in the hedge or woodland by the briar-roses, or

overtops the corn, or glistens in the meadow just ready for the scythe. Wherever it grows in abundance we may infer that the soil is poor, and it is most likely to be either of a clayey or light sandy nature, as this plant does not prevail on stiff rich soils. The bulbous variety, the Onion Couch, forms little strings of knobs, like small onions, at the base of its stem, and is so troublesome in corn-fields that when abundant it is often dug up and burned. Professor Buckman remarks of it, that it is a pest on such lands as are frequently to be met with in some parts of Worcestershire, which is mostly made up of disintegrated slabs of new red sandstone; or again at Cheltenham, where are thick beds of ancient marine sands, filling up hollows in the lias. In the latter, which is much used for garden ground, for which it is peculiarly adapted, the Onion Couch has to be picked out in digging with great care, otherwise the evil is continued, as the smallest portion left behind grows with great rapidity.

The stem of the Oat-grass is round and shining; its leaves are lance-shaped, narrow, pointed, and rather hairy. The herbage has a bitter unpleasant flavour, and it is this bitterness probably which makes it unpalatable to cattle, otherwise it would be a valuable pasture grass, both on account of the early growth of its foliage and the large supply which it yields. (Pl. 257. fig 3.)

21. Hierochloe (Holy-grass).

1. *H. boreális* (Northern Holy-grass). — *Panicle* straggling; stalks of the *spikelets* smooth; *glumes* egg-shaped, unequal; *florets* awnless; *root* creeping and



1 BLUE MOOR GRASS
Sesleria coerulea

2 LOOSE PANICK G
Panicum crus galli

ROUGH BRISTLE G
Setaria

1 GREEN B G
S viridis

perennial. This grass has a thick stem, a foot or a foot and a half high. Its panicle is composed of rather large purplish-brown spikelets, with very conspicuous pale brown anthers. It is an extremely rare grass, and is not considered as a truly British plant; for though found in a narrow mountain valley by Mr. Don in Angusshire, it no longer grows there. Its scent is sweet, like that of our Vernal-grass, and it takes its English familiar name from the uses to which it is applied in some parts of the Prussian dominions, where the plant is dedicated to the Virgin Mary, and strewed in the aisles of churches and around the doorways on festival days. It grows in abundance in Iceland, and there, as in other parts of Northern Europe, it is laid in bundles among linen, or hung up in rooms, for its fragrance. Its odour is also believed to cause sleep, and in Sweden it is sold in bundles for these uses. (Pl. 257, fig. 4.)

22. Koelléria (Koeleria).

1. *K. cristáta* (Crested Koeleria).—*Panicle* compact and spike-like, interrupted below; *glumes* flattened, acute; inner *glumellas* white and thin. Perennial. This rare, or rather local plant, grows in dry pastures near the sea, mostly in the north. Its downy stem varies from a foot to a foot and a half in height; its leaves are rough, and fringed on the edges. It flowers in June and July, and its spikelets vary as to downiness, being sometimes quite smooth, and of a greenish silvery hue. (Pl. 257, fig. 5.)

23. Seslléria (Moor-grass).

1. *S. cærúlea* (Blue Moor-grass).—*Panicle* oval,

slightly one-sided; outer *glumella* jagged, and with a short point. Perennial. This is a very beautiful early flowering grass, bearing its short greyish-green cluster from March to June. This changes as it grows older into a purplish-blue colour, and its large anthers are of a deep purple hue. In continental countries both flowers and foliage are of a deeper and more decided blue than on our mountains. The stem of the Moor-grass is from six to eighteen inches high, and its leaves are rather blunt, with a minute point, and rough on the keel and edges. It is most abundant in limestone districts in the north of England, and grows also on the banks of the Shannon. (Pl. 258, fig. 1.)

24. Pánicum (Panick-grass).

1. *P. Crus-gálli* (Loose Panick-grass).—*Spikes* alternate or opposite; *glumes* 2, lower small; upper *glume* and barren *floret* awned, or tipped with a short, rough spine. Annual. This is a coarse grass, not truly wild, but naturalized in moist fields about London. The spikelets are near together, and at the base of each are two or three long bristles. The leaves are broad, harsh, tinged with purple, and the seeds are very large. It flowers in July. (Pl. 258, fig. 2.)

25 Setária (Bristle-grass).

1. *S. verticillàta* (Rough Bristle-grass).—*Panicle* spike-like; bristles of the *involucre* rough, with erect teeth; *glumellas* smooth, very hard and firm. Annual. This is a naturalized grass, very local, and rarely plentiful



1 RIGID MEADOW GRASS
Poa rigida

2 FLOATING MEADOW GRASS
Poa fluitans

3 CREEPING SEA MEADOW GRASS
Poa procumbens

4 RECURVED MEADOW GRASS
Poa distans

5 LONG-LEAVED SEA MEADOW GRASS
Poa [illegible]

6 PROCUMBENT SEA MEADOW GRASS
Poa [illegible]

on any spot. It has been found about London and Norwich, in cultivated fields, and bears in June and July its pale green, or pinkish, or deeper purple flowers. (Pl. 258, fig. 3.)

2. *S. víridis* (Green Bristle-grass).—*Panicle* spike-like; bristles of the *involucre* rough, with teeth which turn downwards; *glumellas* smooth. Perennial. The crowded spikelets of this grass, with long, rough bristles at their base, are usually green, though occasionally tinged with purple. It flowers in July and August, growing in sandy fields about London and Norwich, but is not a true native of Britain. (Pl. 258, fig. 4.)

3. *S. glaúca* (Glaucous Bristle-grass).—*Panicle* spike-like; *bristles* with erect teeth; *glumellas* wrinkled. Annual. This species is distinguished chiefly by the wrinkled glumellas. It has long, slender leaves, hairy at the base, and its bristles are numerous and rigid. It flowers in October, and is a naturalized plant; found at Weybridge in Surrey, and at Hoddesdon in Hertfordshire.

26. Póa (Meadow-grass).

1. *P. aquática* (Reed Meadow-grass).—*Panicle* erect, much branched; *glumes* small, egg-shaped, thin; outer *glumellas* much larger than the glumes; *spikelets* many-flowered, erect, awnless. Perennial. The margins of our rivers, lakes, and standing waters have their grassy borders, among whose herbage grow some of the brightest of our wild flowers. One of the tallest and most plentiful of the grasses by the river is this Reed Meadow-grass, which grows by the side of either flowing or

standing waters in great abundance. It might serve by its height to remind us of the grasses of warmer climates, for its stout stem is occasionally, in favourable situations, six feet high. It is a native of most parts of Europe, and abounds in the fens of Lincolnshire and Cambridgeshire, where it is sometimes cut down three times in a year, forming not only a rich pasturage all the summer, but constituting a large portion of the winter fodder for animals. It grows not only on the moist lands watered by rivers, but in the water itself, and may be seen rising above the elegant leaves of the Arrow-head, and the broad foliage and rose-coloured flowers of the Water Plantain, and waving about like a plume far above the surface of the stream. Owing to the rapid growth of this, as, indeed, of most aquatic plants, it soon fills up the standing pools, and even when the water of the river runs but slowly it gains ground very quickly, sending out its powerful creeping roots, and taking firm hold of the soil. On this account it sometimes proves a formidable impediment to the drainage of moist districts. Curtis says of it that the waters in the Isle of Ely become so encroached upon by this and other aquatics that they are obliged to be cleansed by an instrument called a bear, which being drawn up and down the streams tears up the water plants by their roots.

The large, repeatedly branched panicle of this grass is, during July and August, composed of a great number of brownish-green spikelets; the slender branches of the panicle are rough, the leaves are long, broad, and of a bright green colour, taper-pointed, and smooth. The

plant when dry is used by country people in packing goods, and also mingles with the stems of other large grasses and sedges in the thatch of the barn or cottage. (Pl. 259, fig. 1.)

2. *P. flúitans* (Floating Meadow-grass).—*Panicle* nearly erect, very long, and slightly branched; *spikelets* long, slender, roundish, but slightly flattened, with many florets; outer *glumella* very long, with seven prominent ribs and a central point; *root* creeping and perennial. This thick, succulent grass often grows abundantly in ditches and stagnant waters, its stem rising to the height of three feet, with long, narrow, pale green leaves, rough on both sides, often folded at the keel. The nearly erect panicle expands in July and August, and we have seen it lingering yet amidst the November gales. It is long and slender, with slightly roughish branches, arranged usually in twos and threes. The spikelets are varied with pale delicate green and white, and have purplish anthers, and are sometimes on short, undivided stalks. The seeds of this plant are large, but in this country are not plentifully produced. They are almost as nutritive as grains of wheat, and are in some countries used as food. These seeds constitute the *manna-seeds* of commerce, and in Holland, as well as in some parts of Poland and Germany, they are gathered in great quantities, and used for food. De Theis remarked, that he had seen the Polanders in the suite of King Stanislaus gather these manna-seeds on the banks of the Meurtha. It is abundant in Germany, on the margin of standing waters, as well as on very wet meadows; and Meyen observes of it, that "round

Berlin, where the plant grows singly, no one thinks of the well-tasted seeds which it bears; but further east, in East Prussia, Masuria, and the Lower Vistula, it grows in such quantities that the seeds are gathered with great profit, without the plants having been previously sown." Several fine kinds of groats for gruel are made of these seeds, and they are sold in shops under the name of Manna-seed. The grains are eagerly eaten not only by waterfowl and other birds, but also by fish, especially the trout. The long narrow leaves, too, which lie floating on the surface of the water, form a sweet herbage for horses and cattle; and the cows may be seen on a summer or even a winter day going far into the pool to crop it, for it is green and nutritious and plentiful, even at the season when herbage is scarce. (Pl. 259, fig. 2.)

3. *P. marítima* (Creeping Sea Meadow-grass).—*Panicle* erect, with its lower branches in pairs, or with spikelets on simple stalks; *spikelets* flattened, narrow; *glumes* taper-pointed; outer *glumella* firm and of purplish colour; *root* throwing out runners, and perennial. This is a short grass, varying in height from half a foot to a foot, and bearing in July and August, a firm, rigid cluster. It is often of a sea-green colour, the flowers tinged with purple, and the leaves generally folded, compressed, and pungent. It is a common sea-side plant, growing mostly in marshes, or on the grassy banks of sea-walls, as on those of Dimchurch in Kent, and also on the borders of the River Medway in the same county; and is often so covered up with mud that one wonders how it can thrive at all. It occasionally

grows in drier places, as at the base of the chalk cliffs near Dover. (Pl. 259, fig. 3.)

4. *P. dístans* (Reflexed Meadow-grass).—*Panicle* spreading; *branches* finally turning downwards, lower mostly in fours or fives; *spikelets* narrow and small, of 3—6 florets; *glumes* short, unequal. Perennial. The round slender stem of this grass is often a foot and a half high, generally prostrate at the base, and the panicle which appears in July and August, is light and graceful, with numerous rather small spikelets on branches which are rough to the touch, and which bend downwards in the manner which characterises this species. Its leaves are smooth, flat, and unfolded. It is nearly allied to the last species, and is equally rigid, but the reflexed branches and smaller spikelets, as well as the tasteless leaves, distinguish it. In *P. marítima* the lower branches are always erect. It is also usually taller and more slender than that plant. It grows on sandy sea-shores, and has fibrous roots without runners, and usually few leaves. It is rather a local grass, generally found on sandy pastures on the coast. Sometimes, however, it grows on the borders of brackish rivers, as on the muddy shores of the Avon, near Clifton, where it flourishes in great abundance, and is the companion of the Creeping Meadow-grass and of the Sea Procumbent Meadow-grass. (Pl. 259, fig. 4.)

5. *P. Borréri* (Borrer's Sea Meadow-grass).—*Panicle* spreading; *branches* short, lowermost ones generally in fours, often standing out horizontally from the stem, but when in fruit always erect; *spikelets* small and of 4—7 florets, narrow; outer *glumella* blunt, with a minute

point; *root* tufted and perennial. This grass is often found growing with the last two species in salt marshes, especially on the south-eastern coast. Its leaves are short and flat, and remarkable for their long sheaths. Its panicle appears in July, and the spikelets are very much smaller than in the two preceding grasses, and the branches fewer. The stem is about a foot high. It is a local but not rare grass. (Pl. 259, fig. 5.)

6. *P. procúmbens* (Procumbent Sea Meadow-grass).—*Panicle* compact, scarcely branched except at the lower part; *branches* upright, rigid, and never bending; *spikelets* narrowly lance-shaped, of about four florets; *glumes* small, blunt, strongly ribbed; *root* fibrous and annual. This is a not unfrequent grass on the maritime shores of England, though rare in Scotland and Ireland. The stem, which is round and smooth, always bends more or less at the base, and is from half a foot to a foot long, bearing in June and July, its compact cluster, about two inches long, of small grass-green spikelets, turning all one way on their branches, which stand in two rows on the stem. Mr. Knapp remarks of this grass, that at Hartlepool, where sea-weeds were burnt in order to obtain an alkaline salt for the alum works at Whitby, after showers of rain an alkaline lixivium floated in the yard from the stacks of sea-weed, destroying all vegetation; yet that this grass, though not frequent in the neighbourhood, luxuriated there abundantly. (Pl. 259, fig. 6.)

7. *P. rígida* (Hard Meadow-grass).—*Panicle* compact, erect, rigid, with branches in two rows, the *branches* being sometimes undivided so as to be a raceme; *spike-*



1 HARD MEADOW GRASS
Poa rigida

2 DWARF WHEAT M G
P lobacea

3 ROUGHISH M G
P trivialis

4 FLAT STEMMED M G
P compressa

5 SMOOTH STALKED M G
P pratensis

lets small and narrow, of 7—10 florets; *glumes* unequal and acute; *roots* fibrous and annual. This little wiry hard grass, with its rigid cluster one or two inches long, is common in June, on dry heaths, old walls, and rocks, near the sea. The branches of the panicle are short and rough, or sometimes almost wanting; the spikelets growing close to the stem on very short stalks. The wiry erect stem is rarely more than five inches high, and the leaves very narrow, flat, and tapering at the point. The root takes very little hold of the soil. (Pl. 260, fig. 1.)

8. *P. loliácea* (Dwarf Wheat Meadow-grass). — *Panicle* racemose, rigid, usually one-sided, very rarely branched; *spikelets* narrow and oblong, of about 8—12 florets; *glumes* blunt, nearly equal; *root* annual. This grass is much like *P. rígida*, equally stiff and wiry, and of about the same height. The spikelets are mostly arranged down the main stem on alternate, short, stout foot-stalks, more or less distant, each stalk bearing one spikelet, and all turning one way. It flowers in June, and grows on sandy soils and on rocks, but is not, like the last species, a common plant. Its stem is stout and slightly curved. (Pl. 260, fig. 2.)

9. *P. compréssa* (Flat-stemmed Meadow-grass).— *Panicle* rather one-sided and close, but spreading when in flower; *spikelets* oblong or somewhat egg-shaped, of 5—7 blunt florets; *root* creeping, with long runners, and perennial. There are two varieties of this grass; one having three silky nerves on the outer glumella, and its florets connected by a web; and another in which the nerves are five in number, and the florets free. This Meadow-grass is readily distinguished by its flat stem,

which bends at the base, is rather stout, and usually more than a foot high. The panicle, which opens in June and July, is little branched, of a sea-green tint, often more or less tinged with purple; the leaves grow early in spring, but are not numerous; they are short, narrow, and tapering to a point. In the variety in which the glumella is 5-nerved, the stem is flattened and has many knots, and the branches of the panicle are short. This grass is frequent on dry, stony places, and on the tops of walls. (Pl. 260, fig. 3.)

10. *P. praténsis* (Smooth-stalked Meadow-grass).—*Panicle* loose; *spikelets* oblong, of about four florets; *stem* smooth, upper sheath much longer than its leaf; *root* creeping and perennial. There are two varieties; the leaves of one being broad, those of the other narrow; and a third variety is of a bluish sea-green tint. This species is in early spring one of our greenest grasses, and to it we owe much of the beauty of the meadow-lands, where it forms a valuable pasture plant. Either this grass or the Meadow Foxtail, when growing in abundance, indicates that the land is naturally good, or that it has been well drained; but one of the recommendations of this species is that it may be cultivated on almost any soil. Though the plant varies in different situations, yet its leaves are mostly broad, and its smooth stems of good size. Even their bending at the base is serviceable, by preserving the matted form of the turf so useful in pasture-lands; and the Smooth-stalked Meadow-grass is one of those commonly called by the farmer "Sweet grasses," being very nutritive. A good grass field often has this, the perennial Rye-grass, one or two

species of Fescue, the Cock's-foot, and that form of the Marsh Bent which sends out long runners; and these and some other good grasses will, if the land be in good condition, soon take possession of the soil; while inferior grasses and such as are fitted only for poor lands will gradually disappear. Some grass, however, which is natural to the meadow, will probably for some time assert its right, and come up even under the improved condition of the land, but it dwindles away in the course of a few seasons. This species and the next are often used by gardeners for lawns. It flowers in June and July, and its panicle varies much in size. (Pl. 260, fig. 4.)

11. *P. triviális* (Roughish Meadow-grass).—*Panicle* loose; *spikelets* of 2—3 florets, connected with a web; upper *sheath* rather rough and much longer than its leaf; *stem* roughish. Perennial. This is a slender grass, with a tufted fibrous root, and a stem one or two feet high. It is a more graceful plant than the last, though much like it, and its spikelets are smaller. It is very common in meadows and pastures, and is considered by Curtis to be one of our best grasses for moist soils and sheltered situations; and though its herbage is rather less nutritious than that of the last species, yet it is very plentiful. The plant grows naturally in moist shady places, and is well adapted for grass-plats in towns, where the smoke and confined air are so unfavourable to vegetation that no grass save this and the Annual Meadow-grass will contribute to the greenness of the little spot on which the eye of the dweller in cities is so glad to repose. The green panicle

is much branched, and flowers at midsummer; the leaves are taper-pointed. (Pl. 260, fig. 5.)

12. *P. bulbósa* (Bulbous Meadow-grass).—*Panicle* close, erect; *spikelets* egg-shaped, with four florets, which are silky at the keel and connected by a web; *root* perennial. This is a very distinct species, having a white serrated edge to its leaves, and a stem which swells at the base, so as to resemble a bulb. It is an early grass, growing chiefly on the sandy sea-shores, bearing its spike-like cluster on a stem about a foot high, and flowering in April. It has scarcely expanded before it begins to wither away, and its bulb-like knots lie drifting about on the sand all the summer and autumn till they finally fix themselves into the soil. It is found chiefly on the east and south-east shores of England. (Pl. 261, fig. 1.)

13. *P. alpína* (Alpine Meadow-grass).—*Panicle* erect, spreading when in flower; *spikelets* oval, of four or five florets; outer *glumella* silky at the keel, and of a beautiful deep purplish red, with a clear margin; *root* perennial, fibrous, and tufted. In a variety, *glomeráta*, the panicle is densely crowded. This grass is extremely abundant in the lofty mountains of England and Wales, and, like the greater number of grasses growing on elevated positions, is viviparous, forming buds between the stem and leaves. Its stem is from six to twelve inches high. Its panicle flowers in July and August, is somewhat drooping, the spikelets large and of a fine red colour, and the leaves are short, blunt, and tipped with a minute spine. (Pl. 261, fig. 2.)

14. *P. láxa* (Wavy Meadow-grass).—*Panicle* loose,



1 BULBOUS MEADOW GRASS.
Poa bulbosa

2 ALPINE M. G.

3 WAVY M. G.
P. flexa

4 WOOD M. G.

slightly nodding; *spikelets* egg-shaped, of three or four florets; *florets* either connected by a web or free; outer *glumellas* silky at the keel; *root* fibrous. This is a mountain-grass, and grows on Ben Nevis and Loch-na-Gar. It is slender, of a rather pale green, with a stem from six to twelve inches high, flowering in July and August, and bearing broad greenish purple spikelets. It is often viviparous. (Pl. 261, fig. 3.)

15. *P. nemorális* (Wood Meadow-grass).—*Panicle* loose, slender, slightly leaning to one side; *spikelets* egg-shaped, of from three to five florets, which are silky at the keel; *root* perennial. Of this plant there are many varieties. Their characteristic differences consist in the length of the uppermost sheath of the leaf, the shape of the ligule, and the circumstance of the florets being either connected with a web or free. Some of the varieties are so marked and constant that many botanists have considered their characteristics as permanent, and describe them as distinct species. Such are the *P. cæsia*, which has an erect slender panicle, of a most beautiful blue colour, the foliage of which is more or less glaucous; the *P. Parnellii*, a mountain-grass, which grows in upper Teesdale, and which is an elegant, very slender, pale green plant; as well as *P. Balfourii* and several others; but Drs. Hooker and Arnott do not consider the distinctive marks as constant. The Wood Meadow-grass is the only species of the genus which does not grow wild on open pasture-lands. It is very common in our woods and thickets, and is a delicate, upright grass, with many leaves in early spring, flowering in July and August, and with a stem one or two

feet high. It has not been much grown on open pasture-lands, but it yields a fair amount of tender and delicate herbage, which cattle seem to relish in the autumn. It is a late-growing-grass, and affords more herbage at that season than in the earlier part of the year. (Pl. 261, fig. 4.)

16. *P. ánnua* (Annual Meadow-grass).—*Panicle* somewhat triangular, with spreading branches; *spikelets* egg-shaped, of five or six florets, destitute of a web; *root* fibrous. This little bright green grass, and a little flower called the Shepherd's Purse, are perhaps the two most common plants in the world. Not only is this grass found in every meadow of the temperate zone, but occasionally in most climates, often on mountains at a great elevation. And not alone in meadows do we see its cheerful verdure, but on almost every waste spot where a wild weed may spring;—on the bank by the road-side, among the mosses and stone-crops of the wall, on the garden path, among the stones of the beach just beyond the reach of the tide, with the reeds by the river, on the churchyard grave, and between the crevices of the city pavement where the foot of the passenger daily treads. Be the season inclement as it may, nor winds, nor sleet, nor chilling rains will exterminate it, though the frost may nip its blades. It is in flower all the spring and summer, and occasionally even in winter, and it ripens its seeds and sheds them in the soil, even before the time of weeding commences. It is more useful on meadow-land on which cattle feed than it is fitted for hay. It is one of the sweetest grasses, and it is thought that during more than eight months of the


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year it ripens and deposits seed. This circumstance, and its growth under a lower temperature than any other grass will submit to, render it almost like a perennial on the green mead, and it is well suited for parks and lawns, with the vernal grass and white clover, as it does not turn yellow, like Sheep's Fescue, and some other grasses used for pleasure-grounds, but makes a beautiful and permanent verdure. Much do those who delight in the green-lane or wide-spread meadow owe to this little plant. It has many fibres to its root, and they serve to fix the grass so firmly that the frost, which loosens so many plants, leaves this steadfast as ever. "It becomes," says Mr. Knapp, "a support to its needy neighbours in winter, and by its plentiful and sheltering foliage preserves a certain degree of humidity during the exhalations of summer." It is sometimes the prevailing grass on meadow-land.

The stem of the Annual Meadow-grass is from six to ten inches high; its leaves are rather blunt, and somewhat soft and drooping. It is the plant to which we might refer when we use the comparison "green as grass," for its hue is always bright and never tinged with purple. (Pl. 261, fig. 5.)

27. Tríódia (Heath-grass).

1. *T. decúmbens* (Decumbent Heath-grass).—*Panicle* of a few 2—4-flowered spikelets on very short stalks, which are often undivided; *glumes* nearly equal, almost as long as the spikelet. Perennial. This grass is very abundant on dry pastures and heaths, especially in mountainous countries. It was formerly included in

the genus Poa, but it is very unlike the plants of that family in its general appearance, and its spikelets are very much larger than those of any Meadow-grass, save *P. flúitans*. The plant varies less than most grasses. Its stems are rigid from six to twelve inches high, and bend at the base, but those which bear the flowers are upright. The leaves and sheaths are rather hairy, the former narrow and tapering to a sharp point; and the large spikelets are commonly four or five in number, and rarely exceed seven; they are arranged alternately on the upper part of the stem. The glumes are rounded on the back, firm and leathery, and of a pale green colour, quite covering the florets; and instead of a ligule to the leaf there is a tuft of hairs. This grass is of little service on the hilly pasture. (Pl. 262, fig. 1.)

28. Bríza (Quaking-grass).

1. *B. média* (Common Quaking-grass).—*Panicle* with straggling branches; *spikelets* broadly egg-shaped, of about 5 florets; *glumes* very concave; heart-shaped, and blunt, and shorter than the florets. Waving to every wind, and shaken even by the approaching footstep, this pretty quaking, or tottering, or "doddering" grass is plentiful on meadows and pastures in the month of June. Our old writers call it Pearl-grass, and some country people know it by the name of Maiden's-hair. Its botanic name, taken from the Greek verb "to vibrate," is expressive of its nicely balanced spikelets, which hang on branches so slender as to cause a continual tremulous motion. The stem is twelve or eighteen inches high, the spikelets are purplish-brown, varied with white, the leaves

tapering to a sharp point. It is frequent in meadows and pastures, and among the short grass of downs, but wherever abundant it indicates a poor soil, and it disappears when the land is brought into better condition. It is too bitter to be a favourite fodder-grass, but cows, horses, and sheep will eat it. (Pl. 262, fig. 2.)

2. *B. mínor* (Small Quaking-grass). — *Panicle* straggling; *spikelets* triangular, about 7-flowered; *glumes* longer than the florets. This is an annual species, with a very slender, erect stem from 1—2 feet high, and very numerous, small pale-green spikelets. It is found in dry and sandy cultivated fields in the extreme south-west of the kingdom, and flowers in July. (Pl. 262, fig. 3.)

29. Dáctylis (Cock's-foot grass).

1. *D. glomeráta* (Rough Cock's-foot). — *Panicle* branched, with oval clusters, which taper to a point; *spikelets* small and densely crowded; *glumes* membranaceous; *root* tufted and perennial. This large, rough, coarse-looking grass may be seen in flower during June, a few occasional clusters lingering on even through the autumn. It is common in every meadow, by roadsides, on moist or dry land, on hill or dale, but most luxuriant among trees and bushes, and well fitted for growing in orchards, or on moist shady spots. The erect, round, rough stem is from 1—3 or even 4 feet high, the upper part usually bearing its tufts on spreading straggling branches; but sometimes these are wanting, and the panicle consists of one tuft, usually tapering towards the summit, and often tinged with a delicate or more deep lilac tint. The leaves

which are long, flat, and narrowing to a point, are hard, rough on both sides, and of a rather dark bluish-green. This grass yields a very large amount of herbage, which has been found, both by chemical test and experience, to be highly nutritive and much liked by cattle, except when its leaves are very large and coarse. As it shoots up rapidly and plentifully, and produces a good aftermath, it is a valuable grass; but, owing to the coarseness of its stems, it has not been so well liked for hay by our farmers. Professor Buckman remarks of it: "That it is capable of giving a large crop, my experiments fully prove, not only of culms, but also of aftermath; the culms, however, are somewhat coarse, but with their nutritive qualities must be valuable, especially in chaff. I am not aware of its having been tried as a self-crop; but there can be no doubt that, if examples be tried different from those generally employed, this grass has much to recommend it." It has been found to succeed when in combination with the Rough Meadow-grass, the hard variety of the Sheep's Fescue (*duriúscula*), the Meadow Fescue, and the Ray-grass, the far greater proportion being the Cock's-foot. It will thrive even during drought. (Pl. 262, fig. 4.)

30. Cynosúrus (Dog's-tail grass).

1. *C. cristátus* (Crested Dog's-tail).—*Raceme* in a long, narrow, one-sided spike; *florets* with a very short awn. Perennial. This grass is, during June and July, easily distinguished by the involucre at the base of each of its spikelets, consisting of segments scarcely thicker

than threads, and very rigid. The spikelets are on short stalks, and are arranged alternately on the wavy upper part of the stem. Each spikelet has from 3—5 florets, the outer glumella ending with a very short awn. The slender stem is from half a foot to a foot and a half high, and the leaves are flat, tapering to a point, smooth and shining on the under surface, but rough above. It is a very common grass on dry pastures; and its crested spike may, in August, after the young leaves have been cropped or withered, be seen standing up in numbers, so as to give a brown tint to the sward. It is a grass well fitted by the slender nature of its foliage for lawns and pleasure-grounds, which are often subjected to the scythe, and where it would not remain long enough untouched to assume this brown hue.

The fine, uniform, and strong stems of this Dog's-tail grass have been used in plaiting straw for bonnets, and several other of our native grasses have been found useful for this purpose. Cobbett, who made many experiments on this subject, considered that the straw of our wild yellow oat, *Avèna flavèscens*, was better fitted than any other native species for this purpose; he recommended also the Vernal-grass, Rye-grass, and the Dog's-tail grass as well worth attention; and others have tried with success the Mat-grass (*Nárdus stricta*), and the Sheep's Fescue, as well as some species of Bent (*Agróstis*). It has been thought by good botanists that these grasses might be extensively used for plaiting-straw instead of the wheat-straw now commonly used for bonnets. The wheat which furnishes this straw is chiefly grown on light soils of Bedfordshire and Hert-

fordshire; and though the plait of Essex is superior in point of workmanship, yet the straw produced in that county is not so good as that of Bedfordshire. The straw used in the Tuscan bonnets is obtained from a species of wheat sown on poor soils, that it may produce long slender stems; and the Leghorn hats are made of the same straw differently worked. (Pl. 262, fig. 5.)

2. *C. echinátus* (Rough Dog's-tail grass).—*Raceme* compact, egg-shaped, with awns as long as the glumellas. Annual This is a very rare grass, found on sandy sea-shores in the extreme south of England, as in Sussex and in Kent, where it has been seen on the chalk near Dover, as well as on some other spots. Its stem is slender, 1 or 2 feet high, the leaves flat, tapering to a sharp point, and rough on both sides; and the author has a specimen gathered near Manchester which is more than three feet in height, with its greyish-green bristly cluster an inch and a half long, but this is unusually large. The spikelets are small, and crowded on short stalks, all turning one way, and the fine divisions of the involucre at the base are very rough. This grass flowers in July. (Pl. 262, fig. 6.)

31. Festúca (Fescue-grass).

1. *F. uniglúmis* (Single-glumed Fescue).—*Raceme* in two rows, turning one way; *lower glume* very minute; *florets* shorter than their awns. Annual. This is a very local grass, known from the other species of Fescue by having apparently one glume, the other being scarcely perceptible. The stem is from half a foot to a foot high, and very leafy. The florets have but one


SINGLE CLEFT MED. FESCUE GRA.
Festuca unigluma
BARREN FESCUE G.
Festuca bromoides
SHELPS FESCUE G.
REED FESCUE G.
MEADOW FESCUE G.

stamen; it grows on sandy sea-shores, and flowers in June. (Pl. 263, fig. 1.)

2. *F. bromoídes* (Barren Fescue).—*Panicle* turning one way; *glumes* very unequal, their awns rough. Annual. In one variety of this grass the flowering panicle is erect and spreading; in another the panicle droops at the end, and is long, narrow, and spike-like. The latter form, *myurus*, is commonly called Capon's-tail grass. The Barren Fescue varies very much. Its height is from 6—12 inches, and its stem is more or less leafy; it grows on dry pastures and walls. In its ordinary form its spikelets are something like those of the Barren Brome-grass, but erect and much smaller. The leaves are long and slender, like bristles. It flowers in June; its florets have but one stamen, and in the form *myurus* the panicle is sometimes half a foot long. (Pl. 263, fig. 2.)

3. *F. ovína* (Sheep's Fescue-grass).—*Panicle* close, somewhat turning one way; *spikelets* usually with awns half their length; *leaves* all bristle-like; *root* fibrous, tufted, and perennial. This is a most variable grass, and consequently one which is exceedingly puzzling to a young botanist. In one form, *vivipara*, a grass about half a foot high, the spikelet is converted into a leafy shoot, and the grass is, in appearance, most unlike its ordinary condition; in another, *tenuifolia*, the leaves are much longer than usual; in *rubra* the root frequently sends out runners, the suckers terminating in erect shoots; but this mark does not appear, from Professor Buckman's experiments, to be constant, for, though occurring on sand deposits, the root does not creep in

clays; it yields a quantity of fine herbage, but grows in separate tufts, and does not, this botanist says, present any inclination to form matted turf. A well-marked variety, and one which is very unlike the ordinary form of Sheep's Fescue, is that termed *duriuscula*, or Hard Fescue, which is common on dry hilly pastures, often growing to the height of 2 feet, with a large pyramidal panicle with straggling branches, and long and somewhat broader leaves than most forms. The Sheep's Fescue-grass received its specific name from Linnæus, because so much relished by sheep, and he thought that these animals cared little for pastures in which it did not exist. It is too small a grass in its usual form to be very productive, but it grows abundantly on dry elevated heaths and downs, forming a large portion of the grass and fine turf of many a hill-side. It affords a most pleasant and nutritive food to all kinds of herbivorous animals; and Gmelin says that the Tartars choose to fix, during the summer, in those places where there is the greatest plenty of this grass, because of its worth to their flocks and herds. The leaves are very numerous, more or less curved, apt to turn yellow in autumn, and sometimes becoming, on hills near the sea, of bright orange tint. It is abundant on almost all our chalky downs, and its height is from three to nine inches. The latter variety, *duriuscula*, is usually more or less of a sea-green tint, and its panicle often purplish. This, as well as the common form, make excellent grasses for lawns, on account of their fine herbage, and they do not often require mowing. The larger form is an early grass, and will thrive on

almost any soil, though growing naturally mostly on those which are sandy, and it resists drought in summer, and retains its verdure remarkably in winter. It is a most useful grass. (Pl. 263, fig. 3.)

4. *F. sylvática* (Reed Fescue).—*Panicle* erect, much branched; *spikelets* rough; *glumes* very unequal; *leaves* narrowly lance-shaped, rough at the edges; *root* tufted and perennial. There is a small variety, *minor*, with narrow leaves. This is not unfrequent in mountainous woods; its stem is from 2—4 feet high, and has at its base a number of brownish scales. The leaves are long, and of somewhat yellowish green. It flowers in July. It is an early grass, but one not much relished by cattle. (Pl. 263, fig. 4.)

5. *F. praténsis* (Meadow Fescue).—*Panicle* always close; *branches* in pairs, one bearing a single spikelet, the other one or more spikelets, sometimes wanting; *spikelets* 5—10 flowered; *outer glumella* scarcely awned. Perennial. In one variety of this grass some or all of the branches of the panicle are in pairs, one usually having several spikelets. In another, which is often described as a distinct species (as *F. loliàcea*), the spikelets are arranged alternately on the stem in a spiked form, either without stalks or with very short stalks. This form is very much like the Floating Meadow-grass in appearance, and it is a grass much valued by owners of grass lands. The Meadow Fescue is from a foot to a foot and a half high, the leaves flat and rough, the upper spikelets on branches springing immediately from the stem. It is a very common plant, often forming a large portion of our meadow-grass near rivers or

streams, the variety *loliàcea* being less frequent. Though rather a coarse grass, yet the Meadow Fescue is, when young, much relished by cattle and sheep, and affords excellent hay. On some soils it becomes extremely large and coarse, and hence less serviceable. (Pl. 263, fig. 5.)

6. *F. elátior* (Tall Fescue-grass).—*Panicle* loose, spreading, with many branches, which are mostly in pairs, each bearing 2 or more spikelets, and straggling after flowering; *spikelets* very numerous, and shortly awned. Perennial. This grass differs from the preceding in appearance, yet many botanists consider it not as a distinct species, but a merely accidental variety of it. The genus *Fescue* was once believed to contain many more species than now, as experience has proved that some plants considered distinct gradually run into one type under culture and on different soils. This is not an unfrequent plant in wet meadows, flowering in June and July, and growing in large coarse tufts. It differs from the *F. pratensis* by its much branched spreading panicle. The upper spikelets are on short stalks proceeding from the stem, the lower ones on simple or divided branchlets, the cluster being large and having a full and branched appearance. The leaves are flat, tapering to a point, rough within, and smooth on the outside. The branches of the panicle are rough, and the panicle often bends to one side. It is a very productive grass, and its herbage, though coarse, is nutritious. Dr. Calvert says it is ravenously preferred to all other grasses by cattle and horses. (Pl. 263, fig. 6.)

7. *F. gigantéa* (Tall-bearded Fescue). — *Panicle* branched, drooping towards one side; *spikelets* 3—6



1

HAIRY WOOD
Bromus

UPRIGHT ANNUAL
B. dianthus

flowered; *glumes* very unequal, awn very long, inserted a little below the point of the outer glumella. Perennial. In a form found in Norfolk the panicle is larger and more drooping; in another the panicle is smaller and erect, the leaves are narrower, and the spikelets about 3-flowered. This grass when fully grown may be distinguished by its large size, for it is one of the very tallest of our grasses, and one which is common in shady woods and moist hedges. In the latter places it often even overtops the shrubs; for when shade and moisture combine, its stem will sometimes rise to the height of 6 feet, while in drier places it is not more than half as high. Its stem is leafy, and the upper sheath is larger than the leaf. The leaves are broad, flat and rough on both sides, and of a deep green colour, but the panicle is pale green. This is large and loose, much like the Brome-grasses, especially the Hairy Wood Brome-grass, but with smaller spikelets and of a brighter green colour; the abundant foliage is eaten by cattle, but this is not one of the most nutritious grasses. It flowers in July and August. (Pl. 263, fig. 7.)

32. Brómus (Brome-grass).

1. *B. eréctus* (Upright Brome-grass).—*Panicle* erect without branches; *spikelets* narrow, lance-shaped, erect; *florets* distant from each other, about twice as long as the straight awn. In one form the spikelets are smooth and shiny, in another they are downy. Perennial. This is not a common grass, but grows on dry sandy or chalky soils in fields and by road-sides. The stem is commonly smooth and round, and 2 or 3 feet high; the root leaves

are narrow, and the upper leaf always much broader than the others. The erect panicle expands in June and July, and is remarkable in the early part of its growth for the purplish colour of the spikelets and their awns. The grass is frequent on the dry stony hills of Somersetshire, Gloucestershire, and Wiltshire, where it attains unusual luxuriance, and is sometimes four feet in height. In its wild state it is one of the most common grasses of the Cotswolds, where it descends also into the vale. It is remarkable for being the only native species, if not the only species, of Brome-grass which is perennial. It is a harsh plant, and has long been known to be rejected by cattle. Professor Buckman remarks: "Its agricultural value is practically demonstrated by the disinclination of cattle to eat it, and the very poor hay it makes; and it is interesting to find that in the analysis of twenty species of our commonest meadow grasses by Professor Way, this grass in the dry state stands the seventeenth in its amount of albuminous or flesh-forming principles, being nearly at the bottom of the list, or among the last in point of value." (Pl. 264, fig. 1.)

2. *B. ásper* (Hairy Wood Brome-grass).—*Panicle* drooping, with long, little divided branches; *florets* remote, hairy; *awn* straight, shorter than the larger glume. Annual. This is one of the commonest species of the genus; and its slightly rough stem, which is 3 to 6 feet high, bears in June and July an elegant nodding panicle of spikelets, which are sometimes an inch long, of a greyish green hue, and rough branches. The root leaves are very broad, much more so than those



1 AWNED BROME GRASS
Bromus arvensis

3 SMOOTH EVE B. G.
B. sterilis

4 HUMID FIELD B. G.
B. commutatus

2 DRY FIELD B. G.
B. tectorum

5 SOFT B. G.

on the stem, silvery hairs are scattered over them, and they are rough to the touch. This grass grows in moist woods and hedges, but is of no agricultural value, being so harsh and coarse that cattle rarely eat it. (Pl. 264, fig. 2.)

3. *B. stérilis* (Barren Brome-grass).—*Panicle* drooping, with long, little divided branches; *spikelets* very long; *florets* distant from each other, shorter than the straight awn; outer *glumella* very distinctly 7-ribbed. Annual. In the month of July this tall and handsome grass hangs its cluster of large narrow long-awned spikelets, each on a long slender branchlet, in many a hedge, or on waste ground, or road-side. In the early period of their growth they are pale green, sometimes delicately tinted with purple; they afterwards become dull greyish green or occasionally dingy brown, and their awns are at all times very conspicuous. The stem of this grass is 1 or 2 feet high, faintly marked with lines; the leaves broad, flat, tapering to a point, and downy. It is one of our commonest grasses, and one which often mingles among the clustered grasses in the winter bouquet. It flowers in June. Cattle never eat it. (Pl. 265, fig. 1.)

4. *B. diándrus* (Upright annual Brome-grass).—*Panicle* erect, with scarcely divided branches; the long narrow *spikelets* mostly on short stalks rising directly from the stem; *florets* erect, about as long as the straight awn. In one form, having a compact panicle, the stem, branches, and glumes are downy; in another, the stem is smooth, except at the upper part, and the branches are rough. This is an annual grass, very rare,

and of little or no service to the agriculturist. It is found on sandy barren spots, chiefly in the South of England, grows below St. Vincent's rocks near Bristol, and more rarely about Edinburgh. The round smooth stem is about a foot high, the panicle smaller than in the last species, and always upright; the spikelets are large and often of a purplish hue, and the somewhat hairy leaves are long and taper to a point. Its flowers have 2 stamens. (Pl. 264, fig. 3.)

5. *B. máximus* (Great Brome-grass).—*Panicle* loose, upright at first, but finally drooping, the branches little divided and becoming longer after flowering; *spikelets* downy; *florets* distant from each other, and about half the length of the straight awn; outer *glumella* about half as long as its awn. Annual. This handsome grass is remarkable for its long awns. It is 1 or 2 feet high, the leaves downy on both sides. It flowers in June and July on sandy places in the Channel Islands. (Pl. 265, fig. 2.)

6. *B. secalínus* (Smooth Rye Brome-grass).—*Panicle* loose, its branches little divided; *spikelets* large, oblong, flat; *awn* straight, about as long as the floret; the edges of the glumellas not overlapping those of the floret above them. This is a conspicuous plant when, in June and July, its panicle, 3 or 4 inches long, and composed of large flat spikelets, on very slender branches, stands on a stem 2 or 3 feet high. The branches of the panicle are hairy, and the yellowish green spikelets polished. The leaves too are hairy, especially so on the upper surface; and as the grass ripens, the florets become distinct and the spikelets

droop. The seeds are said to impart a bitterness to flour if accidentally mingled with wheat, and the large size of the grass renders it a very troublesome plant in the rye or wheat field, where it is not unfrequent. It is considered a doubtful native. A variety occurs in which the spikelets are downy and the panicle little branched. This is found near Edinburgh. (Pl. 265, fig. 3.)

7. *B. commutátus* (Tumid Field Brome-grass).—*Panicle* loose, slightly drooping, the branches divided; the *simple flower stalks* as long or longer than the oblong spikelets; *florets* overlapping each other, but not closely, about as long as the straight awn; *sheaths* hairy. This is a common grass, its herbage growing very early in the year, and its flowers expanding in June and July, by road-sides and in corn-fields. The spikelets are long and glossy, not so broad as those of the last species, and often tinged with purple, and the stem is sometimes three feet high, and rough, as are also the branches of the panicle and the leaves. Sir W. J. Hooker remarks in his British Flora, "'This species,' says Mr. H. Watson, who has studied the British Brome-grasses with great attention, 'is known by its glossy grey green spikelets acquiring a brownish tinge in sunny spots, its longer and harsher peduncles (footstalks) than those of *B. móllis*, and *racemósus*, and its glumellas larger and more inflated than in *B. secalínus* and *arvénsis*.'" This is a nutritive grass, useful in the spring. (Pl. 265, fig. 4.)

8. *B. móllis* (Soft Brome-grass).—*Panicle* erect, close; *spikelets* egg-shaped, somewhat flattened, downy; *florets* overlapping each other closely, and about as long as the straight awn. In one form the panicle is unbranched,

the spikelets are on very short stalks, and, as well as the leaves, thickly covered with down. This is among our most common grasses, growing in almost every meadow, as well as on the sunny banks of our road-sides, and in field borders. It has an erect downy stem a foot or a foot and a half high, and its leaves and sheaths are hairy. It flowers in May and June. The spikelets are large, but smaller than those of the last two species, and are of a very beautiful bright, but not deep green, the chaffy edges of their glumellas showing so plainly that they look as if variegated with white and green. Their glumes and outer glumellas are somewhat downy, and this feature distinguishes the plant from *B. racemósus*, in which these parts, instead of being soft to the touch, are rather rough. The panicle is two or three inches long. The very downy variety is found on sandy ground in Cornwall; it is of a less bright green colour than the ordinary form. The farmer includes the soft Brome-grass with the Barren species among his worthless grasses. (Pl. 265, fig. 5).

9. *B. racemósus* (Smooth Brome-grass).—*Panicle* close, long, and upright, usually with each spikelet on a short stalk, but sometimes with slightly divided branches; *spikelets* egg-shaped, slightly flattened, overlapping each other; *awn* straight, about as long as the glume. This appears to differ from the last species chiefly in being smooth instead of downy. It grows commonly in meadows and pasture lands; flowering in June and July, and its shining spikelets are usually of a lighter green than those of the last species. Its erect round stem is a foot and a half or two feet high. Its herbage shoots



SMOOTH BROME GRASS.
Bromus erectus.

SHEATHING B. G.
B. patula.

TALL FESCUE G.

early in the spring; but it is not a valuable grass, and grows chiefly on poor soils. (Pl. 266, fig. 1.)

10. *B. arvénsis* (Taper Field Brome-grass).—*Panicle* upright, spreading, branched; the *partial flower stalks* longer than the narrow flattened spikelets; *glumellas* shorter than the straight awn; *anthers* remarkably long and narrow. In this plant the glumellas usually acquire a purple tinge, and the flower-stalks are longer than in the preceding species. It is a naturalized grass, found at Southampton, and a few other places; flowering in July and August, and is a lighter, prettier, and more graceful species than the last, with spikelets much smaller than those of most Brome-grasses. (Pl. 266, fig. 2.)

11. *B. pátulus* (Spreading Brome-grass).—*Panicle* erect, spreading loose, drooping in fruit, the lower stalks much lengthened, and either simple or branched; *spikelets* lance-shaped, flattened; *glumellas* rather shorter than the nearly straight awn. Annual. This grass, which is nearly allied to the preceding, is not truly wild. It has been accidentally introduced into the neighbourhood of Hebden Bridge, Yorkshire. (Pl. 266, fig. 3.)

12. *B. squarrósus* (Corn Brome-grass).—*Panicle* drooping, branches undivided; *spikelets* oblong, somewhat flattened; *florets* overlapping each other, nearly smooth; *awn* straggling. Annual. This grass appears to be of recent introduction, and its seed probably came mingled with foreign corn. The spreading awns form a characteristic distinction of the species. It has been found in Kent, Somersetshire, and other counties. (Pl. 266, fig. 4.)

33. Avéna (Oat).

1. *A fátua* (Wild Oat).—*Panicle* large and spreading, its branches rough; *spikelets* drooping; *glumes* large, keeled, and taper-pointed; *florets* 2—3, much awned, smaller than the glumes, with a number of long, stiff, yellowish hairs attached to the base of the outer glumella; *root* annual and fibrous. Several Oat-grasses intrude themselves into the corn-fields, and this is a very common weed there in June, July, and August, rising to the height of three feet. Its flat bright green leaves are marked with fine lines, and the long twisted awn of the glumella serves as an excellent hygrometer, being affected by the smallest change in the atmosphere. This grass is so like the cultivated oat, *A. satíva*, that some think it is but a variety of that plant, from which it is distinguished by its longer awns, and by the stiff hairs at the base of the glumella. Professor Buckman, however, remarks that it is approached in the latter respect by occasional starved or seeded specimens of the field oat, in which the hairs occur. "The circumstance," he observes, "gives some countenance to the belief so general among the farmers of the heavy lias clays, in the Vale of Gloucester—namely, that it is unsafe for them to cultivate oats because they leave behind a degenerated race of wild oats." At any rate it is a troublesome weed, especially in stiff sterile lands. It is common in fields of this kind, either of wheat, barley, or oats, as well as among beans; and its blades being in its early growth so like those of corn, it cannot in the corn-field be distinguished, and is therefore left behind, after hoeing.



1 WILD OAT GRASS.
Avena fatua

2 BRISTLE POINTED O.G.
A strigosa

3 NARROW LEAVED PERENNIAL O.G.

Farmers have long known that the seeds of the wild oat lie a long time uninjured in the soil; and so large is the plant, that it occupies a considerable space on valuable lands, and helps to keep off sun and air from the corn, ripening too before the wheat, and shedding its grain before that is removed from the land. It is a handsome grass with its large cluster of pale green spikelets, their chaffy glumes striped with green lines, and nodding on their slender branches, though the main stem of the grass and of its cluster are erect.

The oat was very early cultivated in this country; its name is a Saxon one, and evidently connected with the verb to eat, the grain having been used as a bread corn as well as for horses. In very old books it is called Haver or Hafer corn; our old herbalists called it ote, ete, or haver; and several European countries have a very similar name for the plant. The officer of the household, who in ancient times had to supply provender for the horses, "horssemete" as it was called, was also termed an Avenar or Avenere, from the Latin name of this grass. In Wales the oat is still called Hever. This elegant grass is the cognizance of the Duke of Montrose. (Pl. 267, fig. 1.)

2. *A. strigósa* (Bristle-pointed Oat).—*Panicle* erect, the branches all turning to one side; *florets* awned, two in each spikelet, each as long as the glumes, and terminated by two long, straight bristles. Annual. This species is common in cultivated fields in June and July, where

> "The bristly barley's purple bloom
> Waves in the gale its egret plume,
> Waved in the gale as lightly float
> The pendants of the bearded oat."

It is much like the oat, among which it often grows; but its upright panicle, and the long straight bristles at the end of the florets, form a distinction both from that plant and the last species. Its stem is two or three feet high, round and smooth, the leaves are rather broad and rough, the spikelets large and oval, their glumes marked with green lines. It flowers in June and July. (Pl. 267, fig. 2.)

3. *A. praténsis* (Narrow-leaved Perennial Oat).—*Panicle* erect, loose, its branches either simple or little divided; *spikelets* oblong, erect, of 3—5 florets, longer than the glumes. Perennial. In a variety of this plant, *vulgáris*, the lower leaves are rolled inward, and their sheaths nearly smooth; in *longifólia* the leaves are very long and narrow, the sheaths rather rough, and the panicle of more yellowish colour; in *alpína* the lower leaves are short and flat, and the sheaths somewhat rough. These varieties differ very much from the ordinary appearance of the plant. This is not a meadow grass of the low-lands, though found on some dry pastures, chiefly in mountainous regions, and it often grows in the crevices of rocks, and sometimes on dry open heaths. The stem is one or two feet high, smooth and glossy, the leaves shining, but more or less rough to the touch. The spikelets are tinged with brown, and their twisted awns are often nearly twice as long as the glumella; cattle sometimes eat its foliage. It flowers in June and July. (Pl. 267, fig. 3.)

4. *A. planicúlmis* (Flat-stemmed Oat).—*Panicle* erect, with many rigid short branches; *spikelets* erect, 5—7-flowered, narrow, oblong; *florets* much longer than the



1 FLAT STEMMED OAT GRASS
Avena planiculmis

2 DOWNY O. G.
A. pubescens

3 YELLOW O. G.
A. flavescens

4 COMMON REED.

glumes. Perennial. This grass has broad leaves, tapering suddenly to a point, with very fine serratures at the edges, and flat-keeled leaf sheaths, the lower part so flat as to become two-edged. It flowers in July. It was discovered by Mr. Stuart Murray, in 1828, in the Isle of Arran, in Scotland. Sir W. J. Hooker remarks of it that it has ever since been cultivated in the Botanic Gardens of Glasgow, where it preserves its characteristic distinction; and adds that the plant is there nearly three feet high, and its leaves half an inch broad. (Pl. 268, fig. 1.)

5. *A. pubéscens* (Downy Oat).—*Panicle* erect, almost without branches; *spikelets* erect, of about 2—3 florets, scarcely protruding beyond the glumes. Perennial. This is a pretty grass in June and July, when it is in flower. Its spikelets are much smaller than those of the last species, and in the sunshine they glisten as if cut out of silver and tinged with purple, in a slender cluster three or four inches long, their hue differing from that of any other wild-oat grass. The plant is not unfrequent in chalk or limestone districts. The stem is one or two feet high, and the upper leaf has a remarkably long sheath. The leaves are somewhat broad, flat, flaccid, and hairy on both sides, and the long awns are of purplish colour, and twist and often cross each other. (Pl. 268, fig. 2.)

6. *A. flavéscens* (Yellow Oat).—*Panicle* much branched; *glumes* very unequal; *spikelets* about 3-flowered; *root* somewhat creeping and perennial. This is among the commonest of the oat grasses, and may be seen in July, on dry sandy or stony meadows, where it is conspicuous

by its cluster of yellow flowers, which is often four inches long. The stem is about a foot high, and the hairy leaves are of a light green hue. The shining spikelets are much smaller than those of any other species, and much more numerous, and they are peculiar too for their unequal glumes. By the end of July the yellow colour of the cluster changes to a dull brown hue. The plant is not very leafy, but the foliage is relished by cattle. It is the stem of this plant which Mr. Cobbett thinks superior to any native grass for straw plait; it has very few knots. (Pl. 268, fig. 3.)

34. Phragmites (Reed).

1. *P. communis* (Common Reed).—*Panicle* large, loose; *spikelets* 3—5-flowered, longer than the very unequal glumes; *florets* enveloped in long silky hairs attached to the rachis of the spikelet. Perennial. All who have lingered at midsummer by the country streams, listening to their music as the waters rustled the sedges or rippled softly over the stones, have observed this tall purplish brown grass, like a waving feather, growing in thick masses, and five or six feet high. In its early growth the cluster is close and of a deep rich purplish brown; then the tint becomes lighter, and the plume, at that time a foot or more long, droops gracefully on one side. A little later the numerous spikelets seem to have turned to pale grey, by the growth of the long silky hairs which surround the florets, and they are thenceforward a mass of down. One may see far away on the landscape this tall reed, fringing many a river,

and forming there a miniature grove. Its smooth leaves, about a foot long, are ribbed, rough on the edges, and of a bright green colour. Patches of immense extent are formed by this plant in the eastern part of England, and called there Reed-ronds. Great use is made of the stems in thatching cottages and barns, for they make the very best of thatch, and the practice of so using them seems very old, as we find Tusser, in his poem, directing the husbandman to the timely care of his roof:—

> "Where houses be reeded,
> Now pare off the moss, and go beat in the reed."

The long stems serve also for cottage ceilings, for screens, and other household purposes; while these, as well as the long creeping roots, are turned to good account in forming embankments near the river. In Sweden the panicle is used by country people to dye woollen cloth of a rich green. Our own villagers sometimes make a pickle of the young shoots, which they cut off from the root; and in early days the long stems were used not only for arrows, but also instead of quills for writing. This elegant plant is not merely an ornament to the margin of the waters. In many low lands of Huntingdonshire, Cambridgeshire, and Lincolnshire, this reed constitutes the crop of the moist soil, and in its proper season is duly harvested, and even taken for sale into neighbouring counties for the various uses to which it may be applied. An immense number of aquatic birds find their home among these reeds; and the ornithologist sometimes finds sheltered there the rare bearded titmouse, with many of the more common

birds; while the sedge warbler hangs her nest on the tall reed, and swings in her safe cradle to the rocking winds. So much injury is done by some birds to the reed crops that the farmers of these districts are compelled, during autumn, to be at much trouble to scare them from their haunts. Mr. Knapp remarks—"As evening advances, one sees crowds of starlings approaching from every quarter in numbers that exceed belief, to pass the night among the reeds, upon which, after various arrangements, they alight in myriads, bearing down by their weight this flexible plant into the water, and one sees large patches lodged, and beaten flat, and spoiled." Men go out in boats to shoot them, and kill hundreds night after night, yet these bold birds still come to the reed-ronds; and as the fox lurks there to seize them, he also tramples down a large number of the reeds.

Many of the reed-crops are now altogether destroyed by the improvement of the land by drainage, and millions of their waving plumes have disappeared before the railroads, and other inventions of recent times. Now and then, as we read in some old book, we are reminded how much more abundant these and other aquatic plants must have been in the early ages of England. In the Anglo-Saxon version of the Life of Guthlac, Hermit of Crowland, first printed about ten years since from a MS. in the Cottonian Library, and apparently written before A.D. 749, we find continual allusion to these reeds, and see how the fens, with their plants, overspread land from which they have now been expelled, to make way for houses and fields of


1 UPRIGHT SEA LYME GRASS
Elymus arenarius
2. PENDULOUS S. L. G.
E. geniculatus
3 WOOD BARLEY
Hordeum sylvaticum
1 MEADOW B.
H. pratense
5 WALL B.
6 SEA SIDE P.

waving corn. "There is, in Britain," says the old writer, Felix of Crowland, "a fen of immense size, which begins from the river Granta, not far from the city of Grantchester. There are immense marshes, now a black pool of water, now foul running streams, and also many islands, reeds, and thickets; and with manifold windings, wide and long, it continues up to the North Sea." No wonder that Crowland, which was in the midst of this wilderness, was described as a place of "manifold horrors and of loneliness, so that no man could endure it;" and no wonder that the hermit who went to live there had his home among reeds and rushes, or that some of the incidents recorded by his chroniclers occurred in the "mere, amidst the bed of reeds."

The reed-grass is commonly called windle-straw by country people :—

> "And the windle-straw so limber and grey,
> Did shiver beneath the tread
> Of the coursers' feet."

There is a variety of this plant which has prostrate stems from 20 to 40 feet in length. (Pl. 268, fig. 4.)

35. Élymus (Lyme-grass).

1. *E. arenárius* (Upright Sea Lyme-grass).—*Spike* upright; *spikelets* of about 3 florets; *glumes* two, tapering to a point and downy; *glumellas* broader than the glumes; *root* creeping and perennial. The Lyme-grass, which grows in abundance on some parts of our shores, forms in May large patches of bluish-green blades, and bears its flowers in June and July. Its

spike is from 4 to 5 inches long, erect, of a sea-green colour, standing on a stem from 2 to 5 feet high; the leaves are long, broad, hard, and rigid, rolled inwards, and ending in a sharp point. Its masses often serve as a little oasis on the desert-looking sand flats, sheltering some sand flowers or green weeds, which, but for its protection and the solidity of soil given by its long creeping roots, could not grow there; and it is one of our most serviceable plants in fixing the sands. Many parts of the coast are quite destitute of it, but on spots where it is abundant, it may be known even far away by the peculiar bluish colour of its foliage. The only grass for which it could possibly be mistaken is the *Marum* or Sea-reed, and it differs from this in having its spikelets seated closely on the main stem, whereas those of that grass are on short foot-stalks. The seeds are in Iceland ground into flour, and used for making bread, and the grass affords a great amount of saccharine matter. It is not eaten by cattle, and, valuable as it is on our shores as a sand grass, it is far more necessary to those of Holland. (Pl. 269, fig. 1.)

2. *E. geniculátus* (Pendulous Sea Lyme-grass).—*Spike* loose, bent downwards; the part of the stem on which the *spikelets* are seated, winged; *glumes* awl-shaped, smooth, longer than the spikelet. Perennial. This plant, which is found in a salt marsh near Gravesend, is not known to grow in any other part of the kingdom, and is rendered so singular by its kneed stem as to be readily distinguished from any other grass. The spike is erect in an early stage of its growth, and the stem next bends into a horizontal

position, finally turning downwards, when it withers and falls off at the joints. The leaves are rigid and rolled inward, the stem about 1 or 2 feet high, bearing in July its very long spike. (Pl. 269, fig. 2.)

36. Hórdeum (Barley).

1. *H. sylváticum* (Lyme-grass, or Wood Barley).—*Spike* upright, compact; *glumes* all awl-shaped, not fringed, rough; *outer glumella* with an awn half its length; *lateral spikelets* with both stamens and pistils, middle ones without either. Perennial. This grass differs chiefly from the next species in having longer awns; it is common in woods and thickets in chalky soils. The leaves are flat, ribbed, acute, rough on both sides, pale green, and pliant; and the spike, which appears in June, is green, and 2 or 3 inches long, on an erect smooth stem, about two feet high. (Pl. 269, fig. 3.)

2. *H. praténse* (Meadow Barley).—*Spike* upright, compact; *glumes* all bristle-like and rough, not fringed; *outer glumella* of the middle spikelet about as long as its awn,—of the lateral ones with a short awn; *lateral spikelets* with neither stamens nor pistils; *central flower* largest, and perfect; *root* fibrous, annual. This is a common grass in damp meadows, and has a smooth stem about a foot and a half or two feet high, with a close spike two or three inches long. It is a slender plant, the leaves narrow and rather rough. It bears in early spring a considerable quantity of foliage, but the roughness of its awns unfits it for hay or pasture grass. (Pl. 269, fig. 4.)

3. *H. murínum* (Wall Barley, Way Bennet).—*Spike*

upright, compact; *glumes* of the middle spikelets, lance-shaped, and fringed,—of the lateral ones, bristle-like and rough; *middle spikelet* with stamens and pistils; lateral ones with neither; *root* fibrous and annual. Every English child knows this common grass, so like the cultivated barley of the field as to be universally called Wild Barley. It is a shorter and stouter species than the preceding, and though not common in Scotland, is found throughout England on walls, cottages, and by roadsides, but rarely occurring among our meadow-grasses. Though not flowering till midsummer, yet it gives early a large quantity of herbage. The stem is a foot or a foot and a half high, the spike about two inches long, and the leaves are flat and rather rough. Both this and the next plant seem to be known by the name of Squirrel-tail Grass; and though there is considerable nutriment in the foliage, yet so much do the prickly awns injure the mouths of horses, that one of the greatest recommendations to an inn in the Isle of Thanet used to be, that the hay was without any admixture of Squirrel-tail Grass. The awns of these barley-grasses are not only long and slender, but they are also thickly set with a double row of very minute spines, so that if this plant happen to intrude itself into the pasture, it causes much irritation to the tongue and throat of an animal eating it. These prickly awns will, on the slightest friction, propel the plant rapidly along, as every country child well knows, from the common practice of putting an ear of barley-grass into the sleeve, and allowing it to make its way from the wrist to the shoulder, which it will do in the



1 CRESTED WHEAT.
Triticum cristatum
2 BUSHY SEA W.
T. pinetorum
3 CREEPING W. OR COUCH GRASS
T. repens
4 FIBROUS ROOTED W.
T. caninum

course of a few minutes. It grows chiefly on sandy soils. (Pl. 269, fig. 5.)

4. *H. marítimum* (Sea-side Barley).—*Spike* compact, erect; *glumes* rough, the inner one of the lateral spikelets half egg-shaped, the rest bristle-shaped and rough; *awn* of the outer glumella in the middle spikelet more than twice as long as the awn of the lateral ones; *middle spikelet* with both stamens and pistils, *lateral* ones with neither; *root* fibrous and annual. This is the smallest of the species, and scarcely ever more than half a foot high, with an erect stiff stem which is prostrate at the base and bears a small spike. It much resembles the last species, but is shorter, more rigid, and of a paler, almost sea-green colour. It is not universally distributed on our sea-coast, but is not uncommon on grassy and sandy places there. It flowers all the summer months. (Pl. 269, fig. 6.)

37. Tríticum (Wheat, or Wheat-grass).

1. *T. cristátum* (Crested Wheat-grass).—*Spikelets* of about four crowded florets; *glumes* awl-shaped, with a terminal awn; *outer glumellas* with an awn as long as themselves; *root* of long fibres, perennial. This grass is not considered as truly wild, but is described as found by Mr. Don, many years since, on the coast between Arbroath and Montrose. Its spike is an inch or more long, on a stiff, slender, leafy stem, remarkably rough, and about eighteen inches high. (Pl. 270, fig. 1.)

2. *T. júnceum* (Rushy Sea Wheat).—*Spikelets* of 4—6 florets; *glumes* blunt, many ribbed, awnless; *outer glumella* blunt, or tipped with a short spine; *root*

creeping and perennial. This is a common grass on sandy sea-shores, and often conspicuous there; its close spike of distant flattened spikelets in two rows, and from six to nine inches long, is supported by a stem from twelve to eighteen inches high. It is a rigid plant, with smooth leaves rolled inward, very slightly downy on the upper surface, and pale green. The part of the stem on which the spikelets are situated readily breaks away at the joints. It is a useful grass in binding down the sands, and like most grasses destined for that purpose, is left untouched by animals. (Pl. 270, fig. 2.)

3. *T. répens* (Creeping Wheat, or Couch-grass).—*Spike* very long; *spikelets* 4—8-flowered; *glumes* lance-shaped, with or without awns; *outer glumella* sharply pointed, or with a short awn. In one form the rachis is smooth or downy, but always with short ascending bristles on the angles; in another the rachis is quite smooth. The second form, which is found near the sea, is of a pale sea-green colour, and is distinguished by having its florets awned, and the edges of its leaves rolled inwards. The creeping perennial root of this Couch-grass is but too well known to the agriculturist, rendering this one of the most troublesome of all the weeds which he has to contend with. The plant is very abundant on many arable lands, as well as on waste places, often giving a green colour to patches of a hedge-bank in winter, when its flat, rather dark green, and somewhat rough leaves hang about the slope. Its roots are most difficult of extirpation, and will retain their vitality amid many injuries. It flowers in the summer months, and its spike occupies about a third part of its stem, which is round, erect,

smooth, marked with lines, and one or two feet high. The roots or underground stems are very sweet and nutritious, cattle of all kinds being fond of their shoots, which are found to contain three times as much nourishment as the stem and leaves. They have been recommended as suitable to be used in brewing table-beer. The Couch-grass is as common in most other European countries as in ours, and abounds even in Siberia. It is known to our farmers by several familar names, as White Couch, Twitch, Stroil, and Quickens. (Pl. 270, fig. 3.)

4. *T. canínum* (Fibrous-rooted Wheat-grass).—*Spike* very long, slightly inclining; the *spikelets* near together, 2—5-flowered; *glumes* lance-shaped, 3—4-ribbed, awned as is the outer glumella; *root* fibrous, perennial. In one variety of this grass found on Ben Lawers, the spikelets are 4—5-flowered, the awn of the florets longer than its glumella, and the leaves rough on both sides; in another the awn of the florets is very short, and the leaves quite smooth, except on the margins. This is a very common grass in woods and hedges, and is distinguished from the last by its roots, which consist of numerous downy fibres. Its round, erect, leafy stem is from two to four feet high, the leaves are flat, of a dark-green colour, the spikelets being seated on the rachis in two rows, and forming a spike three or four inches long. This plant flowers in June and July, and is called Dog's wheat, because this, and probably the other species, are eaten medicinally by these animals. All the species have, when their foliage is bruised, a strong odour unlike that of other grasses. (Pl. 270, fig. 4.)

38. Brachypódium (False Brome-grass).

1. *B. sylváticum* (Slender False Brome-grass).—*Spike* drooping; *spikelets* nearly cylindrical, inclining one way; *awns* longer than their glumellas; *root* fibrous, and perennial. This grass and the next have been placed by former botanists either among the Fescue, Brome, or Wheat grasses, and seem to hold an intermediate place between the two latter. The Slender False Brome-grass is of no value to the agriculturist, as cattle seldom touch it. It grows in woods and hedges, especially in the western counties, flowering in June and July. Its stem is round and smooth, two feet high; its leaves flaccid, broad, hairy on the upper side, and of a deep green colour. It is readily distinguished from the next species by its slender spikelets, as well as by its growth among bushes or trees. (Pl. 271, fig. 1.)

2. *B. pinnátum* (Heath False Brome-grass).—*Spike* erect; *spikelets* nearly cylindrical, in two rows; *awns* shorter than the glumellas; *root* somewhat creeping, perennial. This grass has flat, narrow, rigid, nearly smooth leaves, and in July is very elegant, especially on those chalky, upland, heathy places where it attains great luxuriance. It is always an indicator of a poor soil, and disappears as the land is improved. It is a rare grass, growing in open places in several counties, and was, a few years since, exceedingly luxuriant and beautiful among the grass of Shorncliffe, Kent, where it sometimes grew to the height of three feet, though it is commonly about two feet high. It sometimes has a



double row of spikelets, and a variety with leaves rolling inwards is found near Bath. It is of no value to the agriculturist. (Pl. 271, fig. 2.)

39. Lólium (Darnel Rye-grass).

1. *L. perénne* (Common Rye-grass, Red Darnel, or Beardless Darnel).—*Spike* erect, occasionally compound; *spikelets* 6—8-flowered; *glume* solitary, scarcely longer than the florets, awnless; *root* fibrous, perennial. This common grass of waysides and pastures, with a dark green or purplish green spike, about a third of the length of the stem, is commonly one or two feet high. It varies, however, very much according to the soil on which it grows, being sometimes not half a foot in height, at others rising to that of three feet. Sometimes the spikelets are few and distant, at others they are very close together, and occasionally the spike becomes clustered. It flowers in June and July. Several stems grow together, and are round, smooth, rigid, with purplish joints, and the leaves are pointed, smooth, and marked with lines. The root produces leafy, barren shoots. This grass is extensively cultivated, but in many soils it loses its perennial nature, and becomes a biennial grass. It is believed to be the meadow grass which was earliest cultivated in Europe, though the period at which it was first sown is uncertain. Dr. Plot remarks of it in 1677, "They have lately sown Ray grass, *Gramen loliaceum*, to improve cold, sour, clayey, weeping ground, unfit for Saint-foin." It was sown in the Chiltern parts of Oxfordshire. It has several varieties, known to farmers as Pacey's grass, Russell's Rye, &c. (Pl. 271, fig. 3.)

2. *L. multiflórum* (Bearded Rye-grass).—*Spikelets* many-flowered; *glume* solitary, scarcely so long as the lowest floret; *florets* lance-shaped and awned; *roots* producing barren, leafy shoots, sometimes perennial, becoming biennial or annual under cultivation. This plant is found in some parts of England and Scotland, but only where it has been cultivated in fields. It is the well-known meadow grass, called by the farmers Italian Rye-grass, and is by Dr. Parnell considered a variety of *L. perenne.* Professor Buckman found that both in that and this plant when grown in the Botanic garden, the annual seeding caused the old plants to periodically die out, but they being replaced by seedlings, the first form, *L. perenne*, was tolerably well maintained from year to year; but that the *L. Itálicum*, which he considers as being a variety of *L. perenne*, has a tendency to revert under such circumstances of growth to the original form. The Italian Rye-grass is a handsome plant, its long awns giving it a crested appearance at midsummer. It is paler in colour than the common perennial species; like that it varies much in height, being sometimes even three feet high, and having several erect stems, which grow in close tufts. It was introduced into culture in this country from Italy. (Pl. 271, fig. 4.)

3. *L. linícola* (Annual or Flax Rye-grass).—*Spikelets* many-flowered, oblong or egg-shaped; *outer glumella* longer than its awn, or awnless; tumid in fruit; *root* annual, without leafy shoots. This is a very rare grass, found in cultivated fields near Catterick Bridge in Yorkshire, and about Hurst-pierre Point, Sussex. It flowers in July. (Pl. 271, fig. 5.)

4. *L. temuléntum* (Darnel).—*Spikelets* about 6-flowered,

about as long as or shorter than the glume; *florets* awned, or awnless; swollen in fruit; *roots* without barren shoots, annual. In one form the florets have long rigid awns, about as long as the glumella; in the other they have short awns, or none. The stem of this grass is round, rough at the upper part, erect, two or three feet high, bearing in July a spike sometimes nearly a foot long, composed of rather large spikelets arranged in two rows, on a rough stalk. The leaves are flat, acute, and rough on the upper side, and the plant would attract attention by its large size, as well as by being unlike any other of the grasses likely to be found among our corn. It cannot, however, be called altogether a common grass; for though extremely abundant in the cultivated fields of some of our counties, as in those in some parts of Lancashire, where it is a sad annoyance to the farmers, yet it is a local grass quite unknown in many districts.

The Darnel grows among barley, rye, or wheat, and when in the wheat-field it so resembles the corn while as yet but in blade, that the cultivator can hardly venture to eradicate the weed, lest he should despoil the crop. Our forefathers believed, that in wet summers the wheat degenerated into darnel; and in some retired districts this notion is still entertained, as well as the equally absurd one that rye, in unfavourable seasons, turns into the Brome-grass, so common in the rye-field. Hence *B. secalínus* received its specific name from *Secale*, the Rye, and was long called Smooth Rye. So prevalent was formerly the belief in these changes, that Linnæus found it necessary to write a dissertation in order to refute these opinions. The Darnel is the only grass known, or rather suspected, to be poisonous.

There seems no doubt that this plant is the *infelix lolium* of Virgil, for ancient as well as modern botanists attributed poisonous properties to it, and centuries since laws were made in China, forbidding its use in fermented liquors. If, however, poisonous, it is so only when fermented with the barley malted for beer, or when the bread in the flour of which it is mingled is eaten hot. Some of our best botanists, as well as the great chemists of modern times, like Dr. Taylor and Professor Johnston, believe that it is poisonous under these circumstances. It is remarkable, however, that neither Pfaff nor our own chemist, Professor Johnston, could, by the nicest tests of the volatile oil yielded by the seeds of Darnel, detect any noxious principle, nor any volatile alkali like the narcotic of tobacco; and some botanists believe, with Professor Lindley, that the noxious properties, thus from generation to generation believed to exist in Darnel, are either altogether imaginary, or that their effects are greatly exaggerated. The symptoms said to arise from eating these seeds are vomiting, staggering, impaired vision, and violent tremors, similar to those experienced by persons who suffer from disorders consequent on the continual use of intoxicating liquors; and instances might be quoted, not alone from old writers, but from recent journals, in which cases of this kind are recorded as having occurred. Mr. Lowe suggested lately, in a paper read to the Botanic Society of Edinburgh, when referring to the effects attributed to Darnel, that the virulence of the plant may depend on the place of its growth, varying according to locality. Circumstances of soil or climate are well known to affect the degree of poison contained by a vegetable; thus some umbelliferous plants,

noxious when growing by their native streams, become wholesome by removal to the garden; and the berries of the garden Nightshade (*Solánum nigrum*), so poisonous in our country, form a wholesome dish to the inhabitants of Australia; while the same species of mushroom which, when growing on open land, is wholesome, contains a most pernicious principle if growing by the water-side or in a shady situation. Darnel reared in the Botanic garden, is stated by Mr. Lowe to have produced no effect, when taken in a dose of half an ounce. Much is yet to be learned of the properties of this grass, and it is not impossible that it may be seen that some admixture of a slight portion of ergot of rye, which is well known to cause most dangerous maladies, may have produced effects which have been regarded as resulting from Darnel. Similar errors have prevailed for centuries, uncontradicted by botanist or chemist, as in the case in which a disease called Raphania was supposed to originate in the mingling with flour the seeds of the wild radish, *Ráphanus raphanístrum*, which are now well known to be innoxious.

In some places the Darnel is called Sturdy or Rye. Its oldest name seems to be Dragge or Drawke, by which it is still commonly called in Norfolk and Suffolk; and the author, on making some inquiries respecting this grass of Kentish farmers, found it generally called Drawke by them. There is good reason for believing that the plant translated "tares" in the Scripture parable of the Sower, is this grass; and in conformity with this view, the French translators of the New Testament render the original word by *ivraie*, from *ivre*, to drink. This word is believed to be the origin of the name of

Rye-grass, given formerly to this species on account of its intoxicating seeds, but now used by agriculturists as the name of the well-known wholesome grasses of the genus. The Darnel is less frequent in Scotland than in England. (Pl. 271, fig. 6.)

40. Leptúrus (Hard-grass).

1. *L. incurvátus* (Sea Hard-grass).—*Spike* cylindrical, slender; *florets* awnless. Annual. In one variety the spike of this grass is curved, in another remarkably slender and erect. This singular little plant, though frequent on the Irish coast, is very rare on those of England and Scotland. It grows on the muddy shores of Devon and Cornwall, near Folkestone in Kent, and on the salt marshes about Dimchurch in the last-named county; while on the muddy shores of the Avon, among the salt-water plants which grow at the foot of St. Vincent's Rocks at Clifton, it occurs in such abundance that its numerous short firm spreading leaves form a good portion of the verdure of many a green patch there; and the author has found it even rising up among the flag-stones of a street, leading up the hill to Clifton, and at some little distance from the shore. The grass is of a pale sea-green colour, sometimes a little tinged with purple, four or five inches high, with its spike more frequently a little curved than quite erect. It is a more singular than attractive plant, for the small florets wrapped up in the glumes, are completely embedded in little cavities in the upper part of the grass stem, and require to be looked for ere they are seen, except on some bright sunshiny day, when the eye may be attracted by the little white or yellowish anthers which



1 SEA HARD GRASS,
Lepturus incurvatus
2 EARLY KNAPPIA,
Knappia agrostidea
3 TWIN SPIKED CORD GRASS,
Spartina stricta
4 MANY S C G,
S alterniflora
5 CREEPING DOGS TOOTH G,
Cynodon dactlyon
6 HAIRY FINGER G,
Digitaria sanguinalis
7 GLABROUS [illegible] G,
D humifusa

seem to hang out of the very stalk. The foliage soon turns yellow. It is a plant very likely to be overlooked, and perhaps is less rare on our shores than is generally believed. It flowers from July to September, and its smooth stem is rather leafy. The oblong seed is shut up in the little hollow of each joint of the rachis, and falls off with it. (Pl. 272, fig. 1.)

41. Knáppia (Knappia).

1. *K. agrostidéa* (Early Knappia).—*Spike* slender; *spikelets* on very short stalks; *glumes* purplish; *glumellas* white, very hairy; *root* fibrous, annual. This is a minute and very rare grass, found in sandy pastures near the sea, in the south of England, Wales, and Ireland. Several stems grow from the same root; they are from one to three inches high, erect, and slender. The leaves are smooth, short, and channelled at the base of the stem. The grass flowers in April and May, the spikelets being either green or purplish. It seems to be found more frequently on the coast of Anglesea than elsewhere. It has also been gathered from the banks of the Thames in Essex. (Pl. 272, fig. 2.)

42. Spartína (Cord-grass).

1. *S. stricta* (Twin-spiked Cord-grass).—*Spikes* two or three, close together, sometimes solitary; *glumes* hairy; *root* creeping and perennial. This rare and remarkably rigid little grass grows in muddy salt marshes on the south and south-east coast of England, as on those near Margate, and is found only on spots near the sea. The stem is smooth, marked with fine lines; the leaves, tapering at the base, are jointed upon the sheath, and but little longer than the spikes. The

stem is from six inches to a foot high, and the plant flowers in July. (Pl. 272, fig. 3.)

2. *S. alterniflóra* (Many-spiked Cord-grass).—*Spikes* numerous; *glumes* polished; *root* fibrous and perennial. This is readily distinguished from the last species, both by its smooth glumes, and also by its leaves, which are not jointed on to the leaf-stalk, but are dilated at the base, and continuous with it. It is much taller than the last, and is an exceedingly rare plant of muddy salt marshes. It was discovered by Dr. Bromfield in 1836, at Itchen Ferry, Southampton. (Pl. 272, fig. 4.)

43. Cýnodon (Dog's-tooth Grass).

1. *C. Dáctylon* (Creeping Dog's-tooth Grass).—*Partial spikes* four or five in a crowded cluster; *glumes* smooth, outer *glumella* longer than the glumes; *root* creeping, rough, and perennial. This rare and singular grass is found on the sandy shore between Penzance and Marazion in Cornwall, where it also grew in the days of John Ray, and it was long thought that this was the only locality for it in this kingdom. It is now known to occur also on some parts of the Devonshire coast, and at Studland in Dorsetshire. The stem is from three to six inches high, creeping at the base, and smooth; the leaves rigid, tapering, and downy beneath, those on the stem mostly folded; and it bears its cluster of spreading, slender, purplish-green spikes, with their numerous spikelets, in July and August.

This grass, though so rare in this country, is abundant in some others. It is remarkable for its power of resisting drought, and flourishes on the driest sands of Egypt. Backhouse found it in great plenty in Van

Diemen's Land, and remarks of it at Paramatta: "The grass lands are green from the abundance of *Cynodon Dáctylon*, which not only abounds in pastures in this country, but takes the place occupied by *Poa annua* in England at the bases of walls, by the sides of footpaths, &c." We have too little of this plant in this country to regard it as of any use, nor is it considered nutritious when compared with the many valuable grasses grouped on our pasture-lands. In Hindostan, however, where there is little herbage for cattle, and where every pasture-grass becomes important, this is highly prized. Dr. Jacob, remarking, in his Flora of Cornwall, that this grass has been clearly ascertained to be the *Dúrvá* or *Dúb* grass of the Hindoos, quotes the observation of Sir William Jones: "Its flowers in their perfect state are among the loveliest objects of the vegetable world, and appear through a lens like minute emeralds and rubies in constant motion from the least breath of air. It is the sweetest and most nutritious grass for cattle, and its usefulness, added to its beauty, induced the Hindoos in their earliest ages to believe that it was the mansion of a beautiful nymph; even the Veda celebrates it, as in the following texts of the *Á t' harvana:* 'May Dúrvá which rose from the waters of Life, which has a hundred roots and a hundred stems, efface a hundred of my sins, and prolong my existence on earth a thousand years.'" (Pl. 272, fig. 5.)

44. Digitária (Finger-grass).

1. *D. sanguinális* (Hairy Finger-grass, or Cock's-foot Finger-grass).—*Stem* creeping at the base; *spikes* from three to five, fingered; *spikelets* in two rows, lower glume

very small; *root* fibrous and annual. This is a rare and not truly a British grass, formerly found growing in fields at Battersea. Its stem is from six to twelve inches long, prostrate and rooting at the base, smooth and marked with fine lines. The leaves are hairy, their sheaths rough, with small tubercles. The grass is of no agricultural use; but Mr. Sinclair remarks of it, that in some parts of Germany it is cultivated for its seeds, which are boiled with milk, and form a palatable dish resembling sago. This grass flowers in July and August; its spikes are purplish green, but less deeply coloured than those of the next species. (Pl. 272, fig. 6.)

2. *D. humifúsa* (Smooth Finger-grass).—*Spikes* about three or four; *spikelets* in pairs, one on a longer stalk than the other, and more distinctly egg-shaped than in the last; *lower glume* very minute or wanting; *upper glume* downy; *florets* downy; *root* fibrous, annual. This, too, is an introduced plant, found rarely on fields of a loose sandy soil. Its stem is more prostrate than that of the last species, and the spikes are of a deeper purple. Its leaves and sheaths are smooth. Both species are quite unlike any other grass found in this country. (Pl. 272, fig. 7.)

THE

FERNS OF GREAT BRITAIN.

[*For List of British Ferns, see pages IX, X.*]

THE

FERNS OF GREAT BRITAIN.

One may often observe that persons who are fond of nature, and who have yet never studied Botany systematically, are desirous of commencing that study with Ferns. Their extreme elegance of form, the small number of the British species, the apparent simplicity of their structure, and the comparative ease with which they may be preserved and formed into a good collection, all tempt the learner to "begin at the beginning," and to proceed afterwards to what he would consider as the more complicated part of Botany. Yet the study of the Ferns really requires more attention, and even offers more difficulties, than that of most orders of the Flowering Plants. The scientific descriptions, founded often on more minute distinctions, are less obvious; and in some few cases, even among our British Ferns, it is hardly possible to decide whether a plant should be regarded as a species or a variety, while their classification cannot be considered as even yet fully settled. There are, however, few things which are worth knowing that can be known without patient attention, and we rejoice in

finding this bestowed on the study of these beautiful plants. It is pleasant to see the rambler in the country searching through green lane or by dripping well for the feathery fern, or wandering over the open moor with his handful of

> "Heath-bells dark, and bracken green."

It is pleasant to see the graceful sprays of these plants made the objects of care and culture, and to mark them while waving over fern banks and fern walls, which have been reared for the purpose of adapting soils and situations, light and shadow, so as would best suit the ferns taken from various wild spots. Means are thus afforded for their study to those who have leisure, while the common garden rock is often, also, adorned by the fronds of some of the more hardy kinds; and some of the most rare and delicate may be found in the green-house, or even in the dwelling-rooms of the city, forming an ever-verdant miniature forest in the glass cases of Mr. Ward's invention. Even the Herbarium, with its dried specimens, gives a far better idea of the usual condition of the fern than it does of flowering plants. Leaves and blossoms may, by great care, be preserved so as to retain somewhat of their elegant form, and a little of their natural beauty of colour. The poet could remember with joy the teachings of one who showed him

> "How to make sweet pictures of dried flowers,
> Cull'd in the lanes when glow'd the sultry hours;
> Then press'd and dried, and all on lawn dis-spread,
> To look as infants do that smile when dead."

But the fern spread out on the page scarcely gives us

even an image of death; its green is so living, its form so perfect, that we could fancy it had just been gathered in all its pride of beauty from shadowy woodland or rocky glen.

A popular description of a fern might be, "A large leaf or branch of leaves, bearing no flowers." Yet that leaf-like spray differs from a leaf in several particulars of structure; the most marked of which is, that it represents the leaf and fruit conjoined, bearing its fructification, in most cases, on its under surface. The word *frond*, therefore, applied to the green expansion of a fern, though it originated in the idea that the leaf of a fern was composed of a branch and a leaf, is not altogether an unnecessary distinction. The frond consists of two parts; the leafy portion and the stalk. The stalk is often called the *rachis*, but, strictly speaking, it is composed of two parts. That part which bears the green leaf is the rachis; and the lower portion of the stalk, destitute of the green expansion, is the *stipes*. When the frond is so divided, that, besides the principal stalk, another set of stalks runs through the green divisions, each of these last is a *secondary rachis;* the term *primary rachis* referring to the main stalk.

The lower part of the stalk, the stipes, is in some of our ferns naked; but it is more often beset with chaffy scales, usually thin, and frequently of a pale brown colour. Sometimes these are few in number, and found only at the base; but occasionally they are continued along the rachis, becoming smaller as they are higher on the stalks. The young fronds of several of the large and common ferns may be seen, in May, looking very

singular and beautiful on the green bank, coiled up and covered with large scales; and these scales afford too, by their mode of growth, an assistance to the botanist in the determination of species. The true stem of the fern generally lies along the surface of the ground, or below it, and from its resemblance to a root is termed the *rhizoma*. The stems and fronds of ferns have neither true wood nor bark, but are strengthened by bundles of tubes and fibres, which are embedded in cellular structure. The harder part is external, and the centre is either hollow, or more commonly filled with a soft pulpy matter; so that the stem of a tree fern very much resembles that of a palm in this respect, as well as in the cylindrical form which it often assumes.

The green expansion of a frond differs in various families. In some it is delicate and almost transparent—a mere green film; in other cases it is tough and leathery, or thin, crisp, and brittle. Now we find it of bright grass-green, or it is of a dull olive, or of deep dark or brownish, or greyish-green hue. The difference of the



HART'S-TONGUE.

form, which is often so elegant and delicate in outline, gives to the ferns their grand attraction. Sometimes the frond is like a long narrow leaf, with waved edges, as in the Hart's-tongue; but by far the greater number of our native ferns have their fronds divided into numerous branches and segments.

The most simple form of division is the pinnatifid. In this the edge of the frond is cut into deep segments, nearly but not quite down to the rachis, as in the Scaly Spleenwort. When the frond is divided quite down to the rachis, leaving small portions of the rachis between each green leafy part, it is called *pinnate*, each little leaflet being called a *pinna*. This may be seen in the Sea Spleenwort. When these pinnæ are again divided, in the same manner as in the Lady Fern, the frond is said to be *twice-pinnate*, and the series of little leaf-like divisions are termed *pinnules*; but when



SCALY SPLEENWORT.



SEA SPLEENWORT.

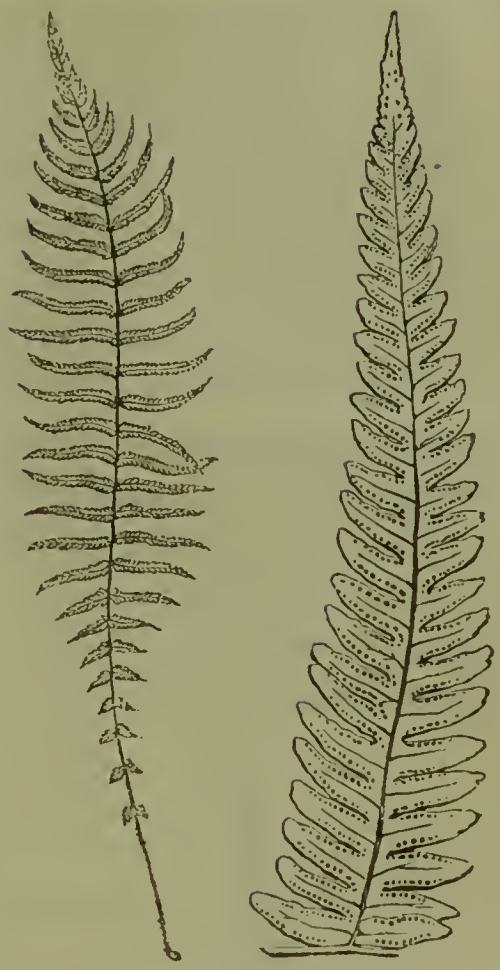


LADY FERN.

the pinnæ are not cut down quite to the rib, and are only lobed, they are termed *pinnatifid*, as in the Mountain Fern. Several foreign Ferns are thrice-pinnate; but we have no British Ferns with fronds of this nature, except some very luxuriant states of the Bracken, and one or two other species. Fronds which are thrice-pinnate are called *decompound*.

The peculiar scroll-like form which the fronds of Ferns exhibit while yet unfolded, must have been observed by all who notice our hedgebanks during spring; for they may often be seen there with the blue-bells, and anemones, and primrose clumps. In Compound Ferns, like the Common

Brake, the divisions are also each rolled into this form, and exhibit, therefore, a number of pale green curves, resembling the shepherd's crook. This mode of unfolding is termed *circinate*. Many exotic ferns unfold in a different manner; and two of our wild genera, the Moonwort and Adder's-tongue, are without the circinate arrangement of their young fronds.



MOUNTAIN FERN.

The mode in which the fronds are traversed by veins is termed their *venation*, and it is usually so unlike the veining of an ordinary leaf as to be at once characteristic of a fern; so that even when these plants are without their reproductive brown clusters, one may always recognise the green frond as that of a fern. By holding up a young fern leaf to the light, it is easily perceived that the veins in most cases have a forked character; that is, they branch off in pairs. Occasionally, indeed, one vein may be seen running straight from the midrib to the margin, without branching; yet, in almost all instances, the vein becomes forked almost immediately on leaving the mid-

rib. The mode of veining, in different families of Ferns, affords a characteristic distinction, to which more or less importance is attached by different botanists. It is on some spot among these veins that the capsules or seed-vessels are placed; and that particular point is termed the *receptacle*, its position with regard to the veins affording a good means of determining genera and species.

Every one who has gathered, from wall or hedgebank, during autumn, any of our native Ferns, has seen on the back, or more rarely on the margin, a number of powdery patches, often of a deep rich rust-brown colour, or occasionally, as in the Common Polypody, bright orange. They are sometimes circular, as in this Polypody; or they lie along the leaf in oblong patches, between the midrib and the margin, as in the Hart's-tongue; or they run together into a mass, and cover the whole back of the frond, as in the fern called the Wall-rue; or they form a ridge along the edge of the leaf, as in the Maiden-hair. More rarely they cluster closely, till all the segments of the leaf are contracted and curled up round the masses of fructification, and then they have an altogether different appearance, and resemble a kind of inflorescence. Our beautiful tall plant, called Flowering Fern, not unfrequent in moist woods, and the little Adder's-



ADDER'S TONGUE.

tongue found on pasture-lands, are instances of this form of fructification.

The small patches on the backs of fern-leaves are the *sori*, or clusters of capsules. These capsules are sometimes termed *spore-cases*, or *sporangia*, or *thecæ*, and they contain the *spores*, which are analogous in their uses to the seeds of flowering-plants, though differing from them in their origin as well as structure. They are a mass of cellular substance, without cotyledons; and instead of sending a shoot up into the air and radical fibres downwards, as the seeds of flowering plants do, they germinate indifferently from any part of the surface. The capsules, as seen under a microscope, are beautiful objects, resembling little hollow spheres of crystal, tinged with a delicate brown hue, and are discovered in most cases to consist of one cell, and to be surrounded by a jointed elastic ring, and to be supported below on an exquisitely slender stalk. When the spores are fully matured, the elastic nature of this ring causes various quick movements, by which the spores or fern-seeds, which look like fine dust, are jerked from the capsule. In some plants, as in the Flowering Fern, the Moonwort, and the Adder's-tongue, the seed-cases are destitute of the elastic ring, and are two-valved.

These clusters of spore-cases are sometimes formed outside the skin of the leaf, and are without covering; but in most of our native ferns, especially during their early growth, they are covered by a thin membrane called the *indusium*. If we examine a young fern, we see first a number of little pale-coloured stripes appearing at equal distances upon some of the veins. In a short

time the outer thin skin or cuticle of the leaf above these stripes separates a little from the green part; then it becomes raised by their growth, the raised part assuming the form of the little heap of capsules beneath; till finally these burst through the skin, and separate it into two equal parts, one edge of which remains adhering to the leaf. This thin skin is the indusium. This frequently disappears before the seeds are ripened. Though usually of the same form as the cluster, it is not always so, but in some few of our native species, as in the Filmy Ferns, it is cup-shaped, and it is then often called an involucre. The spores of ferns are very numerous, exceedingly minute, and of an oval form.

The frond of the fern arises from the rhizoma or root-stock, which may be generally described as a creeping underground or horizontal stem, though in some exotic species it rises erect, and emerging from the earth, resembles the shaggy trunk of a palm. The rhizoma of our native ferns is usually covered with shaggy scales or hairs, which sometimes, as in the Common Brake, are so fine and numerous, that they form a surface of velvety down. Sometimes this rhizoma sends out so many shoots, that they form a firm network beneath the surface of the soil; but more often this portion of the fern occupies little space in the ground. Some root-stocks of ferns are of a deep, rich, red-brown hue. A very common species in our conservatories, the Hare's-foot Fern (*Davállia Canariénsis*)—which, as its name implies, has been introduced from that region of beautiful plants, the Canary Islands—has dark shaggy masses of root-stock about the base of its frond, which terminate in a

thickened extremity, and, being densely clothed with brown hair, instantly remind us of the leg and foot of the animal to which its name alludes. The true roots of ferns are the fibres which descend from the rootstock. Our native species of Fern are between forty and fifty in number; the Horse-tails and Club-mosses being fern-like plants, and not true ferns, though they are commonly called jointed or leafless ferns. None of our ferns in their ordinary state attain more than six feet in height, and we rarely find any, except the Common Brake or the Flowering Fern, nearly so high. When growing in large numbers, they are sometimes conspicuous on the landscape; but nowhere in Britain do they give, as in tropical climates, its characteristic feature to the scenery, or assume the dimensions of trees. Herbaceous ferns belong chiefly to temperate and colder countries; but, in the warmer regions, shrubby ferns cover the ground, forming, like our Common Brake, an under-growth in woods; while the herbaceous species are found chiefly growing upon trees, where, clinging sometimes to the topmost boughs, or investing the rugged trunks with their green sprays, they display a luxuriance and beauty unknown to the British fern. Tree ferns, too, of exquisite grace and beauty, grow in the tropical forest. Whether, however, of humble growth, or rising to the height of twenty or thirty feet; whether herbaceous or arborescent in habit, they have all so much similarity of general appearance, that they are readily known to be ferns, even by those who have never studied the botanic description of plants. Colonel Mundy, when referring to some of the tree-ferns of Australia, more than twenty

feet high, remarks, "One might almost fancy that the tall and dense forests around it had drawn up the well-known shrub, or rather weed, of our English deer-parks, into a higher order of the vegetable family. When I left England some of my friends were fern-mad, and were nursing little microscopic varieties with vast anxiety and expense. Would that I could place them for a minute beneath the patulous umbrella of this magnificent species of Cryptogamia!" On the forks of some of the old timber trees in this region, grew also the Stag's-horn Fern (*Acrosticum alcicorne*), as large as the largest cabbage, the frond exactly resembling the palmated antlers of the moose and reindeer. This luxurious growth extends to a variety of other herbaceous and shrubby species, which hang upon the stems and branches of trees, or rise as an undergrowth to the towering ferns from whose tops spring large fronds, often eight or ten feet long, thrice-pinnated, and so graceful and light that the smallest breeze sets them in tremulous motion. The works of Baron Humboldt abound in descriptions of the ferns in the forests of South America; and every writer on New Zealand tells of the ferns of that island. Humboldt remarks that the arborescent ferns produce the densest of shade in the American forests, by reason of their number and luxuriant growth. He describes some of the old trunks of these ferns as having a metallic lustre, owing to a carbonaceous powder with which they are covered, and he adds that no other plant exhibits this phenomenon. This traveller brought away some of the powder from the old trunks of the Aspidium and Meniscium. In the time of Linnæus four species only of

tree-ferns were known, but a large number have been described by later botanists; and more than three thousand species of ferns, comprising the arborescent and herbaceous forms, have been enumerated. The tree-ferns greatly resemble palm-trees in appearance, and the stems of both are so much alike, that fossil specimens have frequently been described as ferns, but which on further investigation have proved to belong to the Palm tribe.

The conditions under which ferns flourish differ somewhat in different genera; but heat, moisture, and shade are necessary for the luxuriant development of the greater number. They are more numerous in islands than on continents, the arborescent species being almost confined to the torrid zone: the shrubby species generally also preferring a climate of intense heat, and the herbaceous species grow in temperate climes, and are found more rarely in the colder countries, while the northern part of the globe seems quite destitute of any species of this elegant family of plants. As regards the ferns of this kingdom, some grow in almost every county; while some, peculiar to mountainous districts, delighting in limestone soils, or thriving only on the basaltic trap, are necessarily local or rare. Very few of our native species will bear the sea air, yet this is needed for the luxuriance of that beautiful plant of the sea-caves and cliffs, the Sea Spleenwort; while the Wall Rue and Black Spleenwort grace the ruined building or barren rock. The Northern Hard Fern is unhurt by its exposure to the sun and wind of the heath; and the *Lastrea Thelypteris* is our only Marsh Fern. Most of our ferns luxuriate in a shady spot, on a vegetable

mould formed of the falling leaves of many winters, or they wave unseen over the stones of quarries, or among rocks; but their number has doubtless been greatly lessened by the increase of agriculture during past centuries. Not one British fern grows in water.

The terms employed in the description of Ferns are few. A *linear leaf* or *leaflet*, is one of which the two sides are parallel, like the leaf of the grass: the term *decurrent* signifies that the leafy portion runs down the side of the stalk, and gradually merges into it. The *margin* is sometimes serrated or notched like the edge of a saw; a *fertile frond* is one bearing the fructification; a *barren frond*, one from which that fructification is absent. In some ferns, as in the Northern Hard Fern, the barren and fertile fronds are differently formed.

TABLE OF THE ORDERS AND GENERA OF THE BRITISH FERNS, AND FERN-LIKE PLANTS.

Order I. FILICES.—TRUE FERNS.

This Order consists of flowerless leafy plants, their leaves or fronds, with some few exceptions, gradually unfolding in a scroll-like manner, and bearing their seeds or spores in capsules on the backs or margins of the fronds. These capsules are either one-celled and stalked, with an elastic ring; or are without stalk or ring.

* *Capsules with a vertical elastic marginal ring, which bursts irregularly.*

SUB-ORDER I.—POLYPODIACEÆ.

1. POLYPÓDIUM (Polypody).—*Capsules* seated on the back of the frond in circular clusters, without an indusium; *veins* in the British species, simple or forked. Name, from the Greek *poly*, many; and *pous*, a foot; either from the shape of the frond, or from its numerous roots.

2. GYMNOGRÁMMA.—*Capsules* seated on the back of the frond, in linear clusters, without an indusium; *veins* in the British species, simple or forked. Name, from the Greek *gymnos*, naked; and *gramma*, a line or letter; from the fancied resemblance of the forked veins to alphabetical letters.

3. ALLOSÓRUS (Rock-brake).—*Capsules* on the back of the frond, the edges of its lobes rolling under, and forming an indusium. *Fronds* of two forms: the barren frond leaf-like; the fertile contracted, and bearing the fructification at its margin. Name, from the Greek *allos*, various, and *soros*, a mass.

4. WOÓDSIA.—*Capsules* at the back of the frond, covered by a roundish or kidney-shaped indusium, attached beneath the clusters, and cut at the edges into many thread-like segments. Name in memory of Joseph Woods, Esq. Author of "The Tourist's Flora," &c.

5. LASTRÉA.—*Clusters* at the back of the frond, nearly circular, covered by a kidney-shaped indusium, attached at the notched side; *veins* distinct after leaving the

mid-rib, not uniting with the adjoining lobe. Name from M. De Lastre, of Chatelleraut.

6. Polýstichum.—*Clusters* seated at the back of the frond, covered by a circular indusium, attached at its centre. Name from the Greek, *poly*, many; and *stichos*, a row; from the regular lines formed by the clusters of fructification.

7. Cystópteris (Bladder Fern).—*Clusters* of fructification roundish; *indusium* hooded, and attached by its broad base. Name from the Greek, *kystos*, a bladder; and *pteris*, a fern; in allusion to its hollow indusium.

8. Athýrium.—*Clusters* at the back of the frond, covered with a kidney-shaped or crescent-shaped indusium, attached along the upper side of the lateral veins, opening towards the mid-vein, its margin fringed with slender hair-like segments. Name from the Greek, *athyros*, open; because the indusium stands out separated from the frond, and is at length turned back open from it.

9. Asplénium (Spleenwort).—*Clusters* at the back of the frond, oblong or linear, attached along the upper or inner side of the veins; *indusium* opening toward the mid-vein, or inwardly. Name from the Greek *asplenon*, given by the ancients to some fern which they believed to affect the spleen.

10. Scolopéndrium (Hart's-tongue).—*Clusters* on the back of the frond, long, narrow, straight, and in pairs; *indusium* double; the two portions opening towards each other. Name from *Scolopendra*, a centipede, from a fancied similarity between the lines of fructification and the feet of that animal.

11. Céterach.—*Clusters* of capsules at the back of the frond, placed on netted veins, and lying among thick masses of dark brown chaffy scales, which cover the whole back of the frond; *indusium* obsolete. Name supposed to be the *Chetherak* of the Arabian physicians.

12. Blechnum (Hard Fern).—*Fructification* at the back of the frond, in two narrow lines, one on each side the mid-rib, and covered each by a continuous indusium. Name from the Greek, *blechnon*, a name for a fern.

13. Pteris (Brake).—*Fructification* seated at the back of the frond, or rather in a line at its margin; the *indusium* formed of the reflexed edge of the frond, which dilates into a membrane. Name in Greek, *pteris*, a fern, from *pteron*, a plume or feather.

14. Adiántum (Maiden Hair).—*Fructification* at the back of the frond, in roundish or oblong clusters, covered by distinct portions of the reflexed membrane-like margin of the frond, opening towards the mid-rib. Name in Greek denoting *unwetted*, from the peculiar tendency of the fronds to throw off water.

* * *Capsules opening irregularly, having a horizontal or oblique ring, and enclosed in a 2-valved, membrane-like involucre, terminating in a vein at the margin of the frond.*

15. Trichómanes (Bristle Fern).—*Fructification* on the margins of the frond, the clusters having a cup-shaped indusium or involucre of the same texture as the frond, and terminating a vein. Name from the Greek, signifying hair and excess, from its bristle-like receptacles.

16. Hymenophýllum (Filmy Fern).—*Fructification* on the margin of the fern; the clusters seated within a 2-valved involucre, which is an expansion of the frond. Name from the Greek, *hymen*, a membrane; and *phyllon*, a leaf.

Sub-Order II.—Osmundaceæ.

Ferns having the young fronds rolled up in a scroll-like manner, the capsules clustered on the margin of a transformed frond, and forming a panicle, without an indusium; destitute of a ring, and opening vertically by two valves.

17. Osmúnda (Flowering Fern).—*Capsules* clustered into a branched panicle, terminating the frond. Name apparently given from the Saxon words *os*, house, and *mund*, peace.

Sub-Order III.—Ophioglossaceæ.

Ferns having their unfolded fronds straight and not coiled, capsules arranged on a separate branch of the frond, without a ring or indusium, coriaceous, and opaque in texture.

18. Botrýchium (Moonwort).—*Capsules* roundish, sessile, clustered at the margin, and on one side of a pinnated stalk. Name from the Greek, *botrys*, a bunch of grapes, from the appearance of the clusters.

19. Ophioglóssum (Adder's-tongue). — *Capsules* 1-celled, 2-valved, forming a compact two-ranked spike. Name from the Greek, *ophis*, a serpent; and *glossa*, a tongue, from the resemblance of the fructification to the tongue of a serpent.

Order II. LYCOPODIACEÆ.—CLUB MOSSES.

This Order consists of flowerless evergreen plants, with simple, veinless, usually taper-pointed leaves, with their seed-capsules seated in the angle formed by the leaf and the stem, or raised in spikes at the top of the stem. The capsules are destitute of a ring, and are 2 or 3-valved.

1. Lycopódium (Club-moss). — *Capsules* 1-celled, 2-valved, containing a fine powdery substance; or 3-valved, enclosing a few large grains or seeds; *stems* rigid, clothed with short leaves. Name from *lycos*, a wolf, and *pous*, a foot, from a fancied resemblance of the branches to the paw of an animal.

Order III. MARSILACEÆ.—PEPPERWORTS.

These are flowerless plants, bearing capsules without a ring, either enclosed within the swollen base of the leaves, or rising from the root-stock of the plant, and containing seeds or sporules of two sorts, attached to thread-like receptacles.

1. Isoétes (Quill-wort).—*Capsules* surrounded by the bases of the hollow leaves, containing two sorts of spores, some larger than the pollen-like dust which accompanies them. Name from *isos*, equal or alike, and *etos*, the year, because evergreen.

2. Pilulária (Pill-wort).—*Capsules* globular, 4-celled, each cell containing two different kinds of bodies. Name *pilula*, a little pill, which its fructification resembles.

Order IV. EQUISETACEÆ.—HORSETAILS.

These are leafless, flowerless, sometimes aquatic plants, with a hollow, subterranean, creeping stem, and hollow stems marked with lines, and sheathed at the bases of the joints. The fructification is produced in terminal spikes or catkins, either placed on the stem of the branched frond, or on a separate simple frond of earlier growth.

1. Equisétum (Horse-tail).—*Stems* jointed and tubular, fertile ones mostly unbranched and succulent; barren *stems* with whorled branches; *fructification* in a catkin. Name from *equus*, a horse, and *seta*, a hair, because some of the barren fronds resemble the tail of a horse.

1. Polypódium (Polypody).

1. *P. vulgáre* (Common Polypody).—*Fronds* deeply pinnatifid; the *segments* oblong, and tapering or rounded at the end, the upper ones generally smaller. This is one of the commonest of our Ferns, and one which is of easy recognition. It is abundant on all parts of our island, now hanging down from the gnarled branch or sturdy trunk of the old oak, now growing in large clumps on the hedgebank, and forming a good foreground for the artist's sketch; while sometimes it may be seen waving its bright green leaves above the cottage



1 COMMON POLYPODY
Polypodium vulgare

2 C P
Var cambricum

3 C P
Var hibernicum

thatch, or on stone wall or rugged rock. The frond varies from a few inches to a foot and a half in length, and attains its full expansion earlier than most of our native Ferns, being usually developed by the month of May. If in a sheltered spot, it retains its verdure till December, but on an exposed situation, it is easily destroyed by frosts. The leaves have a faint and rather disagreeable odour, and, if tasted, leave a rough and unpleasant feeling on the tongue. Several foreign species of Polypody are, however, aromatic, and the fronds of some are used by the natives of the Sandwich Islands to give a perfume to the cocoa-nut oil with which they anoint themselves. The roots of our common species are very numerous, forming entangled masses, and the horizontal underground stems are entirely covered, when young, with pale brown scales, which disappear as the plant becomes older. The slender stalk of the frond rises from this brown creeping stem, and is usually clothed rather more than half-way down with the leafy portion. This is lanceolate, and divided into lobes, almost to its midrib. The lobes are usually oblong, and rounded at the end, but in some specimens they taper to a point. The margin is generally entire, but is sometimes slightly serrated. A mid-vein winds through each lobe, and lateral veins are produced alternately from it. The same alternate disposition is to be seen in the veins arising from these, which are generally four in number, and it is usually on the lowest of these branches that the large, round, bright orange-coloured clusters are seated; the remaining veins, which are barren, have little club-shaped extremities. The fructification is very

conspicuous, and is usually placed at the upper part of the frond.

This plant, like the Common Brake and several other of our native Ferns, contains a large proportion of carbonate of potash, which in former days was used by glass-manufacturers. The fern was also formerly praised for its medicinal virtues, and the mucilaginous liquid obtained by boiling its fronds had much repute among herbalists as a remedy for pulmonary affections. When boiled with liquorice, it is very good medicine for cold and cough; but it requires boiling for a long time, till the decoction becomes slightly bitter. Michael Drayton, who calls it the "jagged polypodium," elsewhere describes it the "rheum-purging polypody." In Paris this and the mucilage obtained from the leaves of the Lime-tree are deemed, and not without reason, very useful in colds; but, except in villages, the plant is scarcely used in this country. Mr. Newman remarks that he has seen women collecting it in Herefordshire, as a specific against hooping-cough. He says that it is gathered in October and November when full of seed, the barren fronds being rejected. It is hung up in the cottage to dry, and, when required for use, is slowly boiled with raw sugar. The people who were gathering it called it by its old names of Golden-locks and Maiden's-hair. We have known it to be gathered for a similar purpose in Kent, where it was called Golden Polypody and Golden Maiden-hair, doubtless from its bright orange-coloured masses of fructification. In this case, however, it was deemed of great importance that the plant should be gathered from the oak, and not from the shady hedge-

bank or other tree. Several species of Polypody are used for medicines in other countries, as the *P. Calaguala*, the root of which has an oily and disagreeable taste, but which in America is highly valued for its alterative properties. The various species, of which there are immense numbers, adorn the tropical lands of the Western Hemisphere, where they attain great luxuriance; and our Common Polypody, which is found all over Europe, grows in many parts of Asia and America, either this or a very similar species being one of the commonest ferns in many of the woods and hedges of North America. Dr. Joseph Hooker says that in Calcutta the Hindoos boil the young tops of a polypodium with their shrimp-curries. In some countries the plants of this genus are much larger than the British species. Mr. Bennett, in his account of the South Sea Islands, mentions among other ferns, a species of Polypody which he found at Mahiatea, growing in abundance on a high mound built of coral stones. He says that the natives called it *Atua-buua*, or Pig's-god, and believed it to exercise a watchful care over the well-being of these animals.

Several little variations occur in the form of our Common Polypody, the lobes being more or less cleft, or acute, or serrated. One of the most important is that termed *Cambricum*, the Welsh Polypody, in which the lobes become broader, and are again irregularly lobed and toothed. This is always barren. The variety *Hibernicum*, or Irish Polypody, has a broader twice or thrice-pinnate frond, and is fertile. It is an exceedingly handsome form of the fern. The French

call this fern *Le Polypode;* the Germans, *Der Tipfelfarren.* It is the *Boomvaren* of the Dutch, the *Polepodio* of the Spaniard and Italian, and is known in Russia by the name of *Osokor.*

2. *P. Phegópteris* (Beech Fern).—*Fronds* pinnate, the pinnæ united at the base and pinnatifid, the lowest pair turned downwards, and all the rest upwards; *fructification* marginal. This very beautiful plant is called, also, Sun Fern and Mountain Fern. It has a preference for mountainous localities, where it often occurs at a great elevation, and it grows also in shady rocky woods. Though a local plant, it is often abundant on particular spots. It is more frequent in Scotland than in England, and is rare in Ireland. It is found in the northern, western, and southern counties of England, but is unknown in the midland and some of the eastern counties. It flourishes particularly near waterfalls; by the Falls of Lodore, celebrated both for their picturesque beauty, and for the singular rhymes which Southey composed on their rushing waters, this fern is one of the most graceful and lovely objects, springing up from among the rich green mosses which surround it, and its pale green hairy fronds sometimes glistening with drops of the spray dashed from the fall. It is a common fern in Cumberland, growing on the very summits of some of the mountains. It has no just claim to its common name of Beech Fern; for, though found in moist, wooded places, it does not hang from the branches of that noble tree, but its brown root-stocks creep over the damp rock, or among the scattered leaves. The frond rises in May, and may be found in fructification



throughout the summer and autumn. It varies in height from six inches to about a foot, the stalk being generally about twice as long as the leafy part, and slightly scaly at the base. Its roots are black, wiry, hair-like fibres. The frond is very distinct in its outline, being triangular, and tapering at the upper part into a long point. The lower part is pinnate, the pinnæ being narrow, cut nearly to the midrib, and very acute at the point. They are usually in pairs, the lowest pair being at some distance from the others, and turning backwards towards the ground. They are united to the stem by their midrib only; but the other pinnæ, which all point forwards, are united to the stem by their whole width, and are also connected with each other in a pinnatifid manner. This turning backwards of the lower pinnæ gives so peculiar a character to this fern, that those who have once seen it rarely find any difficulty in recognising any further specimens which they may meet with.

The lobes of the pinnæ have each a slender vein running up the middle, from which lateral veins, chiefly unbranched, issue alternately, and extend to the margin, each bearing a cluster of capsules at its extremity, so that the fructification is nearly marginal. The clusters are circular, and of a brownish hue. The young fronds unfold their coils very early, and these often droop backwards before fully expanding. It is a very delicate plant, perishing when placed in culture where it is not protected from the sun, and dying away with the earliest frosts. Many writers dispute its claim to be one of the Polypodies; and it has been by various botanists united with the genus *Polystichum*, or that

of *Lastréa*, or it is sometimes termed *Gymnocárpium Phegopteris*.

3. *P. Dryópteris* (Oak Fern).—*Fronds* with three branches, the divisions pinnate, the pinnæ cut into segments nearly to the midrib, blunt, the uppermost entire; *clusters of capsules* nearly marginal. This very elegant species is sometimes called, also, Pale Mountain Polypody, or it is known by the very characteristic name of Tender Three-branched Polypody. The triple fonds are a marked character of the plant, and it is slender in form, thin, smooth, and fragile in texture. The height of the frond is from four to six inches, and its colour is of a brighter green than that of almost any other British fern, though it loses this brightness if placed in a spot exposed to the sun. Its mode of unfolding the young fronds is very remarkable. In March and April these emerge from the soil, exactly resembling, as Mr. Newman has said, three little balls on wires. These folded scrolls daily uncoil to the air and shaded light, till, by the end of June, not only are the three graceful branches developed, but the dark-brown masses of seed-cases are crowding upon their under surfaces. Like many another plant, however, which rapidly attains perfection, it is somewhat short-lived, not surviving the earliest frosts. The stalk is very slender, about twice the length of the leafy part of the frond, of dark purplish colour, very brittle, with a few scales at its base. The three branches of the frond are triangular, each having a short stalk, and the three uniting in an angular manner with the common stalk of the frond. They spread loosely, and are moved by the slightest wind, the middle branch



TENDER PINNATIFID POLYPODY.

Polypodium d.

being the largest. Each branch is pinnate at the base, and pinnatifid at the upper part: the pinnæ are also pinnate at the base, and pinnatifid and gradually tapering at the top, the edges near the point being undivided, the pinnules and lobes oblong and obtuse. The pair of pinnules at the base of each pinna, close to the main stalk of the frond, are so nearly of a size, and so placed, that when the pinnæ are exactly opposite, they stand in the form of a cross; the two nearest the summit of the branch being smaller than the two opposite, and more nearly on a line with the rachis. There is an angular bend in this fern, just at the point of the rachis where the side branches rise.

A mid-vein winds through each lobe or pinnule, and the lateral veins are usually alternate and without branches. Each terminates at the margin, and the clusters of fructification, which are circular and of pale brown, are placed at its extremity. Sometimes the clusters are densely crowded; in other specimens they are scattered and remote. A large number of the fronds are barren, and the fertile ones are generally taller than those without fructification.

The Three-branched Polypody is not unfrequent in moist woods, and in stony, barren, mountainous places both in England and Wales. It is common in Scotland, and is very generally distributed, being found in every country of Europe. Its underground stem is slender, black, wiry, and creeping to a great distance. This fern is by some writers included in the genus *Polystichum* or *Lastrea*, and is also by Mr. Newman termed *Gymnocarpium Dryopteris*. The dried specimen of the Herbarium,

though preserving well the outline of this fern, gives no idea of its attitude while living. This is gently drooping, not only the whole leafy portion bending down, but the lobes curving down also.

4. *P. calcáreum* (Limestone Polypody).—*Fronds* triangular, somewhat three-branched, lower branches pinnate, the pinnæ pinnatifid, blunt, the uppermost nearly entire; *fructification* marginal. This plant is also known as Smith's Polypody, or Rigid Three-branched Polypody. Notwithstanding, however, its latter name, it is far less distinctly three-branched than the last species, and is very different from it in its habit. The lower branches are much smaller in proportion to the middle one, and all are erect and rigid. It has not either, in any great degree, the angular bend in the stalk of the frond which so well characterises the Oak Fern, though it in some specimens slightly shares this peculiarity. It is also a more rigid firm plant, of a darker, duller green; its stalk is more scaly at the lower part, and green instead of purple; its clusters of fructification usually more densely crowded; it has also a marked distinction in the mealy appearance presented by the surface, owing to numerous stalked glands which crowd over every part of it. The fronds are from six inches to a foot high, nearly triangular, the base shorter than the sides. The stalk is of about the same length as the leafy part; but the side branches are not only shorter, but are more slender than the middle one. The lower branches are pinnate, and the pinnæ are cut down nearly to the midrib; the upper branch is pinnate, with its lower pinnæ again pinnate, and the upper ones pinnatifid, as are also those of the



W. Peckes del et fe

RIGID THREE BRANCHED POLYPODY.

Polypodium calcareum



lower branches, and the upper part of the frond. A distinct winding mid-vein may be seen in each pinnule or lobe, whence issue lateral veins either simple or slightly branched, near the termination of which, towards the margin, are placed the round clusters of fructification, which in the autumn run into a crowded mass, and form a marginal series. The underground stem of this fern is dark-brown and creeping, and its fibrous roots tough. Freshly gathered specimens exhibit a degree of downiness on the frond. It is a rare fern, growing among the loose stones of the limestone regions. It does not thrive so well as several of the species in gardens near towns, but sometimes in country gardens it grows well, requiring lime to be mixed with the soil. It seldom grows very abundantly, though it is very plentiful on the rocks of Buxton, about Matlock Baths, and the Cheddar cliffs, for it seems never to grow wild except in limestone districts. Some authors term it *Lastréa Robertiána, Polypódium Robertiánum,* or *Gymnocárpium Robertiánum.*

5. *P. alpéstre* (Alpine Polypody).—*Fronds* lanceolate, twice pinnate; *pinnules* linear-lanceolate, pinnatifid, with blunt sharply-serrated lobes. This fern has but recently been added to the list of our British species. It has long been known as a native of Switzerland, as well as of several countries at the north and in the middle of Europe. It was first discovered in Britain in 1841, by Mr. Watson, on the mountains near Dalwhinnie, and at Great Corrie of Ben Aulder, Inverness-shire. It was not, however, until 1844, when this botanist again saw this fern in Canlochen Glen in Forfarshire, that its claim

as a British plant was fully recognised by botanists, and it was proved to be the fern known by Continental writers as *Aspídium alpéstre*, or *Aspídium Rhæticum*. It is so like the Lady Fern (*Athyrium Fílix-fœmina*) in its outline and general appearance, that it has doubtless often been overlooked, and believed to be an alpine variety of that plant; for it has since been found to be a not unfrequent fern on mountains in the north of this kingdom. Some writers consider that this fern has at an early period of its growth an indusium over its circular clusters, and this may have induced the Continental botanists to class it with *Aspidium*. Mr. Newman constitutes it a new genus, and calls it *Pseudathyrium*; while a very elegant form of the fern termed by him *P. flexile*, may eventually prove to be a distinct species, or it may be but a variety of this plant.

This alpine Polypody is a very graceful fern, the fronds growing in circular clumps from the crown of a creeping rhizome, and being a foot or a foot and a half high. These fronds are lanceolate, twice-pinnate, narrowed to the base, as much so as at the upper part of the frond, and the leafy portion extends almost to the base of the scaly stalk. The pinnæ are lanceolate and tapering; the pinnules lanceolate, acute and deeply pinnatifid, with serrated segments. The clusters of fructification are small and circular, and are generally placed on the depressed spots between the lobes of the pinnule, and thus form two distinct lines on each side of the midrib, and parallel to it; but sometimes they are more numerous, and in maturity form one mass.

2. Gymnográmma (Gymnogramma).

1. *G. leptophýlla* (Fine-leaved Gymnogramma).—*Fronds* egg-shaped, twice-pinnate ; *pinnæ* roundish, wedge-shaped, three-lobed, the lobes cut and toothed, blunt. This pretty fragile little fern is a biennial plant, very well known in the countries at the South of Europe, and a native of the Atlantic Islands, as well as of Jersey. In the latter island it is not an uncommon plant on grassy hedgebanks, and by the side of rivulets. For some years past its growth in Jersey has led some botanists to enumerate it among British ferns, but it appears also to grow in some spots of the United Kingdom. A correspondent of the *Gardener's Chronicle* for January, 1853, sent for inspection to Professor Lindley a specimen of this fern found in Britain, and, as he observes, entirely new to this country. The writer avoided giving the locality, doubtless from the apprehension that if he did so, some botanists might visit the spot, and entirely eradicate the fern, in order to increase the stores of their own Fernery or Herbarium. He remarks: "This morning I examined the place where it was gathered last year, and found that it is coming up plentifully again. It is growing in a clay soil, on a bank at the foot of a hill, and is much overshadowed with ivy and larger ferns. *Asplénium lanceolátum* grows plentifully all round it, and the bank is in that part covered with a small round lichen. The situation is very damp and much sheltered, and the fern is scattered over a surface of two or three yards ; but I can find no trace of it on any other part of the bank, and I have never met with

it on any other part of the island. The place where it grows is unfrequented, and I do not think it is possible it should be anything but wild."

This fern requires a sandy loam or other light soil when cultivated, and must be kept in shadow and in a moist atmosphere. At the latter end of summer its fronds arise from the seed sown in spring, and are very small and usually barren; but, early in the following year, some taller fronds gradually develop themselves, and these are, when fully grown, about three or four inches high, and extremely delicate in texture. They are twice or thrice pinnate; the pinnæ and pinnules alternate or opposite; the end pinnules bluntly wedge-shaped or rounded, about three-lobed, the lobes terminating with two blunt teeth. The pinnule has a mid-vein, from which issues a forked vein, on which the cluster of fructification is placed, a part of the cluster occupying each branch of the vein, so that the cluster itself is forked; after a time, however, the fructification forms a mass over the whole under surface of the pinnules.

3. Allosórus (Rock-brake)

1. *A. críspus* (Curled Rock-brake, Mountain Parsley, or Rock Parsley).—Barren *fronds*, twice or thrice pinnate; *segments* wedge-shaped, linear, oblong; *segments of the fertile frond* oblong. Many persons visiting the lakes at the north of England bring back with them a few fronds of this elegant little fern; and it is so beautiful in outline, and often renders the rocks so richly



1 FINE LEAVED GYMNOGRAMMA
Gymnogramma leptophylla

2 PARSLEY FERN.
Allosorus crispus

tinted by its green fronds, that it tempts even those who are not botanists to gather it. Southey, who describes it as the Stone Fir or Mountain Parsley, says it is the "most beautiful of all our wild plants, resembling the richest point-lace in its fine filaments and exquisite indentations." We have sometimes, while looking at it, recalled the words of Milton:

> "For not to use alone did Providence
> Abound, but large example gave to man
> Of grace, and ornament, and splendour rich,
> Suited abundantly to every taste,
> In bird, beast, fish, winged and creeping thing,
> In herb and flower."

Graceful it is, and delightful to the eye of the lover of nature; though neither singing bird, nor brightly tinted insect, nor useful cattle, can find nourishment in its luxuriance.

The favourite place of growth of the Rock Parsley is among the rugged masses of stones and broken rocks which lie at the base or on the slopes of mountains, in the north of England. We look for it in vain in the southern counties; but it often occurs in Wales. At first sight its crisped sprays might be taken for a tuft of the leaves of Common Parsley, and it is as bright and green as that herb in early summer. Here and there some patches of the plant gather in abundance and beauty on the slate mountains of Cumberland, relieving their dark tint by the verdant fronds; and many an enthusiastic botanist, who has visited the slate and trap rocks of Snowdon, has hailed this lovely fern with rapture, as he beheld it covering their rugged surfaces in wild profusion.

Both the barren and fertile fronds of the Rock Parsley are twice or thrice pinnate, but the nearly wedge-shaped segments of the barren frond are often cleft at the end. These fronds are more numerous than the fertile ones, and generally of a much lower growth, and of a brighter, more yellowish green. The fertile frond is nearly triangular, from six to twelve inches high, and the segments are oblong, oval, or linear in form. The divisions of this frond have a winding mid-vein, producing lateral ones either forked or simple, which extend nearly to the margin, and bear at their extremities the round clusters of seed-cases. These are destitute of a true indusium, but are concealed by the margins of the leaflet, which are rolled under, and which become quite thin and white. In the early stage of their growth we may see the circular form of the clusters, as they are then distinct; but they afterwards mingle into two continuous lines of bright-brown fructification.

The stalk of the frond is smooth, pale green, slender, very brittle, and usually longer than the leafy part; and the delicate green fronds rise in great number from the horizontal stem, forming a dense mass, and holding very fast to their rocky soils by their black, tough, numerous fibres. They rise in May and June; but he who should visit their localities during winter, would see no remains of the verdant hue with which they clothed the rocks in spring. This Rock-brake is termed by some botanists *Cryptográmma críspa*, or *Ptéris críspa*, and is the *Osmúnda críspa* of Linnæus. It grows freely in cultivation, but requires shade, as too much sunshine renders its green hue less vivid.



1 OBLONG WOODSIA,
Woodsia ilvensis

2 ROUND LEAVED W
W hyperborea

4. Woódsia (Woodsia).

1. *W. Ilvénsis* (Oblong Woodsia, or Ray's Woodsia). —*Frond* lanceolate or oblong, pinnate, hairy beneath. The only two species which we possess in this country of this genus of Ferns, are both very rare plants. They have some peculiarities which readily distinguish them from any other species. Their indusia, instead of covering the clusters of spore-cases, as in other genera, are attached beneath them, enclosing them while young, but tearing as they grow older into numerous little chaffy segments, which look like tufts of slender hairs placed around the clusters. This species grows on the most elevated and bleak mountainous places, among the fissures of rocks. It has been found on Clogwynn-y-Garnedd, Snowdon, and Llynn-y-cwn, on Glyder Vawr, Wales; on the Clova mountains, Scotland, as well as n Durham, where Mr. Backhouse found it growing at the base of some basaltic rocks on the Durham side of the river Tees, about 200 yards below Cauldron Snout. It is said also to have been found formerly in Westmoreland, where a single frond was gathered from the old walls of Crosby Ravensworth Church; but these walls have now been taken down. The fronds of this species are about two or three inches high, and are covered on both sides with shining hairs, which are, however, on the upper surface invisible to the naked eye. The clusters of seed-cases lie among these, on the under-surface, and are almost hidden by them. A few chaffy scales are scattered on the stalk, and this has a joint at a short distance from its base, at about three-

quarters of an inch from the point at which it joins the rhizome—a character belonging to all the species of Woodsia. The rhizome is tufted, and the roots black and wiry.

This fern is of a dull green colour, and dies down to the ground at the approach of winter. The frond is lanceolate in form, and pinnate. The pinnæ, which are usually in pairs, are oblong, with obtuse ends, and a deeply-lobed margin, sometimes cut down almost to the mid-vein. The mid-vein of the segments of the pinnæ is not very distinct; and the lateral veins, which are either simple or branched, issue from it towards the margin, near to which the clusters of seed-cases are seated. This fern is often not more than an inch high, and very rarely more than three inches. It has been termed *Achrósticum ilvénse*, and is now by some writers called *Polypódium ilvénse*, or *Polypódium arvónicum*.

2. *W. alpína* (Round-leaved or Alpine Woodsia).—*Fronds* pinnate; the *pinnæ* pinnatifid, hairy beneath; *clusters of spore-cases* solitary at first, afterwards mingling in one mass. This little fern grows in tufts; its fronds never more than two or three inches in height, and more commonly about an inch high. It is a very rare species, found in fissures of Alpine rocks, mostly in places rarely visited. It has been seen on Snowdon and Ben Lawers, and also in the Glen of the Dole, Clova, and other places of the eastern Highlands. Its stalk is very slender and smooth, only that a few small scattered hairs and scales may be seen upon it at an early period of its growth. The frond is long, narrow, almost linear, and pinnate. The pinnæ are perfectly



MARSH FERN
Lastrea Thelypteris

distinct, and sometimes distant from each other, obtusely triangular, and lobed, and they are usually alternate on each side of the rachis; those at the lower part of the frond being generally farther from each other than the higher leaflets. The upper surface is nearly smooth, but a few minute hairs are scattered along the margin and under-surface. The veining is not a very marked feature of the species. There is no distinct mid-vein, but small veins branch into each lobe, not quite reaching the margin of the leaflet. At the extremity of these veins are placed the clusters of capsules, which soon form a crowded mass. The frond is of a brownish green colour; the roots, black, wiry, and branched; and the underground stem very large in proportion to the frond. Many botanists consider that this species and the last should be united, as they doubt if there is any difference between them which is not caused by variations of situation and circumstances of growth. This fern is called also by various botanists *Acróstichum alpínum*, *Acróstichum hyperbóreum*, *Polypódium hyperbóreum*, or *Woodsia hyperbórea*.

5. Lastréa (Lastrea).

1. *L. Thelýpteris* (Marsh Fern).—*Fronds* pinnate; *pinnæ* pinnatifid; *clusters* marginal, near together, at length mingling into a mass. Several of the most conspicuous of our native ferns belong to the genus *Lastrea*, some of them almost rivalling the Common Brake in size. It was formerly comprised in the genus *Aspidium*, and its chief distinction consists in the kidney-shaped

indusium which is attached to the frond at its notched part. The Marsh Fern is not one of the largest of the *Lastreas*, for its barren frond rarely attains more than a foot in height; and the fertile frond is but an inch or two higher, although under cultivation it is sometimes more than twice as high as when wild. This fern delights in moist boggy lands, occasionally growing in great abundance among the Heather, and Sundews, and Asphodels, and other bog plants; but, like some of its floral companions, it is somewhat local, and many a boggy heath of England is destitute of its fronds, while both in Scotland and Ireland it is a less common plant than in England. In Wales it occurs in numerous localities. It is a native of every country in Europe, and is believed to grow in Africa, and both in North and South America. It was at one time thought to be a frequent fern in Scotland, the Heath Lastrea having been mistaken for it. Dr. George Johnston, commenting, about twenty years since, on this species, says that it had only lately been discovered to be a Northumbrian plant; and adds that it was not a little curious that this fern, which was thought to be so abundant in Scotland, should not be found at all in Berwickshire, and is so rare in the north of England as to have escaped the notice of the many acute naturalists who have botanised there until the late date of 1832-3, when Mr. Embleton drew it from its lurking-place in Learmouth bogs on the very verge of the kingdom. It has since been found at several spots near the lakes of Cumberland, at Hamersham bog in Westmoreland, at Potterie Carr, Askham bog, Heslington fields, Buttercrambe near York,

and in several other spots in Yorkshire. This fern was probably more general and abundant in our island at a period when lands were less drained and brought into culture. It is known to have disappeared from Allesley in Warwickshire. The Rev. W. T. Bree, in the true spirit of a botanist, regrets its absence from spots in which, in his earlier day, he had been accustomed to gather it. Writing from Allesley he remarks: "A pit in this parish formerly abounded with the Marsh Fern; the entire surface was so completely scummed over (if I may use the expression) with a thick blanket of the matted roots of the fern, interspersed with Bog-moss, Marsh Cinquefoil, &c., that no water was visible; and, more properly speaking, the spot should not be called a pit, but a shaking bog. Some years ago the field was brought to the hammer, and purchased by an industrious hard-working man, who, at no small expense of labour, drained the bog and converted it into profitable ground. Of course there was an end of the Marsh Fern in that situation; nor do I know, at this moment, any other habitat where it is to be found." This botanist also expresses his regret when, on revisiting a charming boggy meadow on the skirts of Chemsley Wood, near Coleshill, abounding with the rare Butterworts, Sundews, Grass of Parnassus, Cranberries, Cotton Grass, and the orchideous plant termed Helleborine—a spot which, as he says, was "one of Nature's own botanical gardens,"—he found it converted into a potato ground. This writer says that he had been delighted with the spot in his youth, and had spent many an hour in exploring its natural treasures. He adds, "It is not

only to the cultivation of waste lands, and to agricultural improvements, that the extermination of some of our rarer plants is owing; it may be attributed also, in some part at least, to the rapacity of botanists, who, in some cases, too greedily pluck up, root and branch, every specimen of a rare plant they can meet with." It is owing to a rapacity of this kind that the lovely Flowering Fern, once attaining such luxuriance and beauty in the Isle of Madeira, has been entirely eradicated. Visitors to that island, if they make a prolonged stay, are almost sure to covet the possession of some of the beautiful ferns so abundant there ; and as ferns are preserved with little trouble, many collections from the island are brought into this country, till at length this fern has disappeared from the stations which it once ornamented. It has now been planted there again, and it is to be hoped will not be torn up so eagerly by future collectors.

The Marsh Fern, though a pretty plant, is one of the least ornamental of a genus producing several ferns of peculiar grace. It has a slender stalk, arising from a black underground stem, which creeps to a great extent in the soft soil, and sends forth a large number of tough fibrous roots. The frond is lanceolate in form, and pinnate ; the pinnæ are usually opposite, and cut into lobes nearly to the mid-rib ; the lobes are entire, numerous, and rounded at the end, those of the fertile frond having their margins curled backwards so as to give them the appearance of being narrower and more pointed. The colour of this fern is a pale green, and its texture somewhat thin and delicate ; but the fertile



MOUNTAIN FERN

frond has a much more vigorous appearance than the barren one. The latter appears in May, and the fertile frond in July.

Each lobe of the Marsh Fern has a somewhat winding mid-vein, from which the side veins branch alternately, and the clusters of fructification are seated on both branches, half-way between the mid-vein and the margin. The clusters are abundant, and in an early stage of the plant the thin, white, membrane-like indusium may be seen; but as the capsules increase in size it disappears. The fronds of this species are not so tufted as some others, but spring up, at intervals, from the long slender underground stem. The plant is classed by various writers in the genus *Polypódium Acróstichum* or *Polýstichum;* but it always retains its specific name of *Thelýpteris.* Mr. Newman terms it *Hemestheum Thelýpteris.*

2. *L. Oreópteris* (Heath Fern, or Sweet Mountain Fern).—*Fronds* tufted, pinnate; *pinnæ* pinnatifid; *fructification* marginal. This species resembles the last in so many of its characters that it has often been mistaken for it; but when growing, it has a very different aspect on the landscape. Its fronds, instead of rising here and there at distances from each other, spring up in almost circular tufts, and are usually two or three feet high; the stalk is very short, and covered with pale brown scales, while in the Marsh Fern it is smooth. As its familiar name would indicate, this fern grows on exposed and mountainous places, on heaths and dry pastures, and is found, though less frequently, on open or wooded lowland districts. On some waste lands, as those of

Hampstead Heath, and the heather-clad spots about Tunbridge Wells, its handsome coronals of green rise up in May, and, as summer advances, overshadow the Harebells and Tormentillas, and remain green till winter has swept all blossoms save the daisy from the green-sward. On the hill sides of the north of England, and in the Highlands of Scotland, it is even more frequent than the common Bracken, and it is plentiful on the hilly districts of Wales, but it is rare in Ireland. Mr. Newman remarks of the fronds,—"Immediately they begin to unroll they exhibit the pinnæ placed at right angles with the main stem, and are not convolute as in the allied ferns—a character worthy of particular notice, because unusual among our ferns." The fronds, which are annual, are erect, and in their outline lanceolate and pinnate, remarkably narrowed downwards from about the middle, so that the lower part is quite as tapering as the upper. The stipes is very short, the leafy portion of the frond continuing almost to its base. The pinnæ are generally opposite, and are narrow, pointed, and pinnatifid, and attached only by the mid-rib to the main stem. The fructification is very abundant, forming a line close to the margin; and this plant differs from the Marsh Fern in not having the edges of the lobes turned back. Over every portion of the under-surface lie numerous small, round, glossy, bright yellow glands, which give the young fronds a golden tinge, and form a marked feature of this fern. If we handle or bruise the frond, these diffuse a pleasant odour, similar, however, to that which is possessed in a less degree by several other ferns. Some writers have, on account of



RIGID LASTREA

this fragrance, believed this to be the species designated by Linnæus *Polypódium frágrans*. The mid-vein is very perceptible in the blunt lobes of the pinnæ. It is slightly winding and alternately branched, some of the branches being simple, others forked, and the clusters of fructification are placed at their extremities. The scales are so numerous at the lower part of the stipes as to remind one of the pale brown shaggy mane of an animal, and they are more or less continued to the upper part. The underground stem is scaly, and the roots numerous and tough.

This fern grows throughout Europe, and is called by various writers *Aspídium Oreópteris*, *Polypódium Oreópteris*, *Polypódium montánum*, *Polýstichum montánum* or *Lastréa montána*.

3. *L. rígida* (Rigid Fern).—*Fronds* twice pinnate; *pinnules* narrow, slightly pinnatifid; *lobes* serrated, without spinous points to the teeth; *indusium* permanent, fringed with glands. Notwithstanding the rigid nature of this species, which renders its green fronds less graceful in attitude than some which bow more readily to the winds, yet it is one of the most elegantly formed of the genus, and it is clearly marked by the beautiful divisions of its frond. It grows erect, rising from a thick underground stem; the frond is annual, appearing in May, and dying as soon as the early frosts commence. It is usually one or two feet high, and in various specimens assumes one of two forms. In the one it is almost triangular; in the other lanceolate. It is twice pinnate, with narrow crowded pinnæ, and pinnules which are blunt and oblong, and cut again

into broad rounded serrated lobes, without spinous tips. The stalk is short, very full of scales; and, like the last species, this has a pleasant fragrance, arising from the minute stalked glands which are scattered over it, though the odour is very different from that of the Mountain Fern. The mid-vein of the pinnules of the Rigid Fern is waved; branched veins issuing alternately from it, each becoming forked almost immediately, on leaving the mid-vein. The lower branch divides again, each of the lesser branches running into a segment of the lobe. The upper branch—that is, the branch nearest the top of the frond—bears the circular clusters of fructification about half-way between the mid-vein and the margin, thus forming in an early stage two lines, one on each side of the mid-vein and parallel with it. The clusters are crowded, and gradually mingle into one mass, each being covered by its lead-coloured kidney-shaped indusium, attached by a short stalk, and which is present at every stage of the plant. This fern grows at some elevation on the limestone mountains of the north of England, and seems almost entirely confined to their neighbourhood. At Ingleborough in Yorkshire, it is frequent; and on some of the Lancashire hills it grows in thick, compact masses in wonderful profusion. Mr. Pinder, in writing to Mr. Newman, says—"I met with *Lastrea rígida* in great profusion along the whole of the great scar limestone district, at intervals between Arnside Knot, where it is comparatively scarce, and Ingleborough, being most abundant on Hutton Roof crags and Farlton Knot, where it grows in the deep fissures of the natural platform, and occasionally high in



MALE FERN

Lastrea Filix mas

the cleft of the rocks it is generally much shattered by the winds or cropped by sheep, which seem to be fond of it." It has been found in abundance in the fissures of limestone rocks near Settle in Yorkshire, at an elevation of 1550 feet.

This fern is very similar to the Male Fern, but it differs essentially in not having the lower pinnæ gradually diminished. It is sometimes termed *Aspídium rígidum* or *Lophódium rígidum.*

4. *L. Fílix-más* (Male-Fern).—*Fronds* tufted, twice-pinnate; *pinnæ* linear-lanceolate; *pinnules* oblong, blunt, and serrated; *clusters of fructification* near the central vein. This fern possesses the great charm of commonness. We find it in green lane, on open heath, and beneath the shadowy boughs of the woodland. Like the daisy, it stands connected with the pleasing reminiscences of early days, when we gathered its plume-like fronds to form a stay to the more fragile nosegay of wild flowers, which we bound against its firmer green leaf. We may see the handsome fronds of the Male Fern in almost all our country walks in summer, and often do they vary the more barren landscape of winter. It would be likely enough to be one of the ferns to which Robert Nicols alludes:—

"An ell-lang wee thing, there I ran
Wi' the ither neebor bairns,
To pu' the hazel's shinin' nuts
An' to wander 'mang the ferns:
An' to feast on the bramble berries brown,
An' gather the glossy slaes
By the burnie's side; an' aye sinsyne
I hae loved sweet Orde' Braes."

The tall fronds of the Male Fern, two or three feet in

height, are of a delicate, somewhat pale green, and grow in circular clumps. In April the young leaves are very pretty, curled round into circles and protected from early rains and winds by the shaggy scales, which, in their more advanced stage, clothe the lower part of the stalk in abundance, gradually lessening in size and number towards the higher portion of the frond. Their green sprays are fully open by the time that the Hawthorn tree is decked with its snowy wreaths of May flowers; but if the spring has been cold, many a young shoot was nipped by the winds, though, as several survive, and many new ones make their appearance later, the midsummer sun shines on their luxuriance, while their masses of fructification of rich rust-brown colour lie on their under-surfaces. The fronds are generally about ten or twelve in a circle, and most are fertile; though in some clumps of the plant all prove barren, and then they are of a fuller green tint, and often taller and broader than the fertile leaves: in no case, however, is the Male Fern of a deep dark-green hue. The frond is broadly lanceolate, but slightly narrowed downward, and may be described as twice-pinnate, though the upper portion of the frond is pinnatifid, and, in the pinnæ, those pinnules only which are nearest the main stem are quite distinct from each other. All the pinnæ are slender and tapering, the pinnules of a bluntly oblong form, and serrated at the edge; and all, except the lowest ones, united to each other at the base. The mid-vein of each pinnule is slightly winding, having alternate lateral veins, either simple or forked, or dividing into three branches at different parts of the

pinnule. On the branch which is towards the topmost part of the pinnule the fructification is placed in circular clusters, and these form a line down each side of the mid-vein, even with it, but a little distant from it. The clusters long retain the indusium, which is distinctly visible. It is kidney-shaped, lead-coloured, and attached to the vein just at the point where the stalks of the capsules are situated.

This species, like others of its kindred, has been included by various writers in the genus *Polypódium*, *Aspídium* or *Polýstichum*, but it has always retained its specific name of *Filix-más*. It was very early called Male Fern in this and several of the continental countries; and Gerarde described it by that name, which was probably given because its habit is more robust than that of the graceful Lady Fern. The Italians call this plant *Feli Maschia*, and the Spaniards term it *Polypodio Helecho Masculino*. In France it is called *Fougère*. It grows throughout Europe, and is of old renown, not alone for some supposed medicinal virtues, but because connected with various superstitious practices. Gerarde, who praises the plant for its efficacy in several maladies, quoting also from Dioscorides, adds that the "root hereof is reported to be good for them that have ill spleenes; and being stamped with swine's grease, and applied, it is a remedy against the pricking of the reed." An old notion prevailed that this fern had an antipathy to the Reed, just as Ivy was fancied to have an antipathy to the Vine. Tragus said that the Male Fern and the Reed would not grow together, and that where one grew the other was sure to be absent. Later herbalists tell also

how the roots of this and the Lady Fern boiled in oil, made "very profitable ointments to heal wounds." The green leaves were recommended to be eaten as a cure for some disorders; and an old writer says, referring to this plant: "Fern being burned, the smoke thereof driveth away serpents, gnats, and other noisome creatures, which in fenny countries do, in the night time, trouble and molest people lying in their beds with their faces uncovered." The use of this plant as a medicine was at one time patronised by the French Government, and this fern is said to be still used in Switzerland as a remedy for disease. The astringent roots are employed in the preparation of leather. The young scroll-like fronds were formerly called Lucky Hands, or St. John's Hands, and believed, in days of darkness, to protect the possessor from all the ills of magic, the evil eye, or witchcraft. The old German name of the fern, *Johannis wurtzel*, reminds us of the usages common not alone in continental countries, but also in our own land. Not only was the yellow St. John's Wort dedicated to St. John the Baptist, and burnt on the Midsummer Eve, in the fires raised in honour of the saint, but the delicate fern was duly gathered then, and sold to the credulous, who wore it about their persons, and mingled it in the water drunk by their cows. In Norway this plant is used as fodder for horses and cattle, and, when dried, it makes a good litter for these animals. The plant grows in shady places throughout Europe, and seems to have been used medicinally by Theophrastus and Galen.

The underground stem of this fern forms a turfy or tufted head about the thickness of the finger, black and



TRIANGULAR PRICKLY TOOTHED FERN.

scaly, and the dark brown fibrous roots are very strong and tough. The stipes and rachis are sometimes smooth and yellow, or densely clothed with pale purple scales. A handsome variety, very similar to the common form of the Male Fern, but larger, often attains the height of four, or even five feet. It is by some writers called *L. incísa*. Its pinnules are longer and more pointed, and their edges more deeply cut, the lateral branches of veins more numerous, and the clusters extending over a larger part of the pinnule. A stunted variety, about a foot high, in which the pinnules become rounded lobes, and the fructification is diminished so as to form a line only on each side of the mid-vein of the pinnæ, is called *L. abbreviáta*. The former variety is not unfrequent; the latter is found rarely, in woods and on banks in Cumberland and Yorkshire. A very singular form of this fern is sometimes seen, in which the points of the pinnæ spread out into a kind of fringe, so that the top of the frond looks like a tassel. A similar change occurs also in the Lady Fern, but is unknown to any other of our British species. A remarkable variety termed *Borreri* was discovered by Mr. Borrer, in Devonshire, and seems not uncommon. It has a narrow lanceolate frond of a golden yellow colour, and bright yellow scales on the rachis.

5. *L. Fœnísecii* (Triangular Prickly-toothed, or Recurved Fern).—*Frond* curved, triangular, twice pinnate; *pinnules* pinnate, or deeply pinnatifid; *indusium* jagged at the edge. This is a beautiful and well-marked fern, having its frond very minutely divided. Its peculiarity consists in having the margins of its segments all curled

upwards, rendering their upper surface concave, and not, like those of several other ferns, rolled beneath. It rises in circular clumps, and its fronds droop most gracefully, forming concave arches. They are about one or two feet in length. This fern grows in warm shady woods, sometimes close by the stream or waterfall, at others, at a little distance from it. Occasionally we find it on exposed rocks, but it is not so luxuriant there as in the recesses of the greenwood. It has, when bruised, a very pleasant odour, and is sometimes called Hay-scented Fern. Its triangular frond, broadest at the base, is twice pinnate; the lower pair of branches being not only longer but broader than the rest, and very distinctly stalked. The pinnules on the lower side of the pinnæ are longer than those of the upper. The pinnules are of oblong egg-shaped form, the lowest often much lobed, and the lobes mostly running close together, so as to form a wing, though they are sometimes shortly stalked. Their margins are serrated, and have spinous points. The stalk is about half the length of the frond, and thickly beset with small, torn, pale-brown scales.

The pinnules have a winding mid-vein, from which issue two alternate branches, and these send off branches of lesser veins, the lowest of these on the side towards the point of the pinnules being the receptacle, or spot on which the clusters of fructification are placed. These extend almost all over the under surface of the frond, forming two lines along each pinnule or lobe. The clusters are circular, and partially covered by the indusium, which is kidney-shaped, often of a lead colour,



CRESTED FERN
Lastrea cristata

with the margin uneven or jagged, and set round about with small glands without stalks. The whole plant is covered with minute glandular bodies, giving it a peculiar fragrance. The frond is of a beautiful rich green hue, and its woody stalk is of dark purple colour. This fern is the *Lastréa recúrva*, or the *Nethrodium Fœnísecii* of botanists, and is also by some regarded as a variety of *L. dilatáta* or *L. spinulósa*. It is abundant in Ireland and the western counties of England, and found more or less throughout the kingdom.

6. *L. cristáta* (Crested Fern).—*Fronds* lanceolate and pinnate; *pinnæ* deeply pinnatifid; *segments* acutely and doubly serrate. This fern is found among the ling and heaths of boggy lands, and is much sought for on account of its rarity, though it is less attractive in appearance than many other species. It occurs but in four counties of England, and is found at Bawsey Heath, near Lynn; at Fritton, and Dersingham, and Edgefield, in Norfolk; on Woolston Moss, near Warrington, Lancashire; on Oxton Bogs, Nottinghamshire; on Wybunbury Bog in Cheshire; and a few other similar localities. It has a thick underground stem, branching in various directions, from which, in May, the narrow fronds rise, always in most remarkably erect form, narrowing towards the upper part, though being rounded and not pointed at the top. The frond is about two feet high, the stalk being rather more than a third of the length of the whole frond, and having towards its base a few chaffy bluntly egg-shaped scales, which are always of pale brown colour. The pinnæ of the frond are narrow and triangular in their outline, those at the

base being the broadest, the upper ones becoming gradually narrower, but all of the same general shape. They are deeply pinnatifid, each segment attached by the whole of its base, and connected by a widening of its base to the segment behind it. When the frond attains a greater luxuriance, the pinnæ become longer, and their pinnules more remote, and the margins of the lobes of the pinnæ have rounded notches.

The mid-vein of the lobes is winding, the lateral branches being again divided into several branches, that nearest the upper end of the lobe bearing the circular clusters of fructification, which are thus seated about half-way between the mid-vein and the margin, and generally found only on the upper part of the frond. A flat kidney-shaped indusium covers the clusters, and its margins, though uneven, are not torn. The fructification is matured in August and September, soon after which the fronds perish by the frost.

A fern which is so nearly allied in some points to this species, and in others to the characters of *Lastréa spinulósa*, that it might be regarded as a variety of either, is sometimes termed *Lastréa uliginósa*. It grows on the boggy heath, and is occasionally the companion of the two species which it resembles, but it is a rare plant. It is similar to the Crested Fern while young, in the form of its half-developed fronds, though when fully grown it looks more like *L. spinulósa*. It has two kinds of frond. The fertile fronds are nearly erect, and form somewhat circular clumps about two or three feet high. The barren fronds are narrower, not so erect, and taper at the summit into a very long narrow form ; the pinnæ, too,



NARROW PRICKLY TOOTHED FERN.
Lastrea pinnulosa

are narrow and tapering, with oblong-pointed pinnules, rather deeply notched at their margins, each serrature being tipped with a fine hardened point.

The mid-vein of the pinnules is somewhat winding, with side-veins branching from it; the lowest branch on the side towards the apex of the pinnule bearing a cluster; the clusters forming two lines down each pinna.

7. *L. spinulósa* (Narrow Prickly-toothed or Crested Fern).—*Fronds* linear, nearly erect, lanceolate, twice pinnate; *pinnules* pinnatifid; *indusium* persistent. This fern is not unfrequent in well-wooded districts, growing beneath the green shadow of the trees, or in spots rendered damp by the streams which wander through the wood. It is about three feet in height, nearly erect, and narrow. It is twice pinnate; the pinnules nearest the stalk being larger than the upper ones, and thus giving a tapering form to the pinnæ. The pinnules are oblong, somewhat narrowing upwards, their edges deeply cut, and the lobes serrated with spiny points. It is, however, only the lowest pinnules on the lowest pinnæ which are thus lobed, those towards the top of each pinna, as well as those nearest the base of the pinnæ at the upper part of the frond, being scarcely lobed, or not lobed at all, though still serrated and spinous. A few broad, roundish, almost transparent scales clothe the stipes. The veining is very similar in all these allied ferns. A slightly winding mid-vein runs through the less divided pinnules, giving off branched veins. The clusters of spore-cases are placed upon the smaller veins, which issue from these branches about half-way between the rib and the margin, generally

forming two lines on each pinnule. The same mode of veining is found in the more divided pinnules, the smaller veins being more numerous. Kidney-shaped indusia, with uncut margins, cover the clusters. This species is by many writers considered but a variety of the following. It is also the *Aspídium spinulósum* or *Lophódium spinósum* of other writers.

8. *L. dilatáta* (Broad Prickly-toothed or Crested Fern).—*Fronds* arched, lanceolate or triangular, twice pinnate; *pinnules* pinnate or pinnatifid; *indusium* kidney-shaped. This pretty fern, which is one of the most compound of our native species, is usually about two or three feet in height. Its luxuriance, however, depends greatly on the spots on which it grows, and it sometimes attains the height of five feet, becoming under these circumstances more branched, and acquiring a deeper green hue. Several species of *Lastréa* grow upright, or nearly so, but the fronds of this fern fall into graceful arch-like forms. The outline of a well grown and luxuriant plant is egg-shaped and lanceolate, varying to a narrow lanceolate figure, and in young or half-starved specimens becoming short and broadly triangular. The stalk, which is much thicker at the base than in the upper part, is clothed with long pointed scales, which are in the middle of dark brown colour, but are clear and paler at the margins. The twice pinnated frond has narrow pinnæ; the pinnules at their base being often so deeply divided as to be again pinnate; while the others are pinnatifid, except at the upper parts, where they are merely toothed. The margins of all are serrated and spinous.



BROAD PRICKLY TOOTHED FERN.

Lastrea dilatata

The mode of veining is similar to that of *L. spinulósa*, and the fronds produce a large number of clusters of fructification, which, at first sight, seem to be irregularly scattered. They do not lie in such precise rows as on some other species, but they form two lines crosswise the pinnæ on the larger lobes, and lengthwise on the less divided portions. The indusia are more or less fringed at the edges with stalked glands.

The short triangular form of this fern is not uncommon on exposed places; it is generally of a darker green, often tinged with brown, and the fronds are convex, or even drooping. A variety found on the hills of Westmoreland, Yorkshire, and Lancashire, differs so much from the ordinary condition, that some writers describe it as a distinct species, under the name of *L. collína*. The frond is egg-shaped, very long, and tapering; the pinnules egg-shaped, blunt, and with a broad attachment at the base. They are serrated and spiny, though less so than in the ordinary condition of the plant. In another form, the surface of the frond is covered with glands, and the scales of the stipes are broader.

This Broad Prickly-toothed Fern is a very common plant throughout the kingdom. Its rhizome is often conspicuous above the ground, as it does not creep nor send out branches, but becomes a strong firm base, rising erect like a stem, sometimes half a foot or a foot above the surface of the ground. This fern is found mostly on wooded or bushy spots, where it is sheltered from the strong sunlight:—

"The feathery Fern! the feathery Fern!
It groweth wild, and it groweth free,

By the rippling brook, and the wimpling burn,
And the tall and stately forest tree;
When the merle and the mavis sweetly sing,
And the blue jay makes the woods to ring,
And the pheasant flies on whirring wing,
Beneath a verdurous canopy.

"The feathery Fern! the feathery Fern!
An emerald sea it waveth wide,
And seems to flash, and gleam, and burn,
Like the gentle flow of a golden tide;
On bushy slope or in leafy glade,
Amid the twilight depth of shade,
By interlacing branches made,
And trunks with lichens glorified."

This plant is the *Lophódium multiflórum* of some botanists.

5. Polýstichum (Polystichum).

1. *P. Lonchítis* (Rough Alpine Fern, or Holly Fern).—*Fronds* rigid, simply pinnate, pinnæ not lobed, serrated, spinous, eared at the base. The plants of this genus are nearly allied to those of *Lastrea*, yet they are truly distinct, a most marked feature of difference being in the form of the indusium which covers the seed-clusters. This is circular, and not kidney-shaped, and is attached by a small stalk at the centre. The Polystichums, too, are more rigid in texture than the Lastreas, and more spinous.

We have not many ferns growing on high mountains exposed to the bleak winds; yet the Holly Fern, like the plant from which it takes its name, thrives well on alpine heights, and, indeed, is found only in such situations.



W.Dicke

HOLLY FERN.
Polystichum lonchitis

Very beautiful specimens are gathered from the Clova Mountains, where this evergreen plant presents a beautiful appearance as it springs out from the rocky crevices; and it is extensively distributed on the Scottish mountains, as well as in the north and west of Ireland. A few rocky hilly places at the north of England are named as its localities, as Falcon Clints, Teesdale; Mazebeck Scar, Durham; and Langcliffe, near Settle; Giggleswick, and some other places in Yorkshire. It grows on Snowdon, on heights which the traveller hesitates to climb, thriving even on the loftiest summits of the mountain. It is, however, among the shady clefts of the broken masses of rock, at a less elevation, that this fern attains its greatest luxuriance. In some damp and shady spots among these acclivities it is sometimes a foot and a half high, though in ordinary cases the plants are not more than half a foot in height. The stalk of the frond is very short, and the dark glossy green leafy part is mostly leathery, firm, rigid, and erect, and sufficiently prickly to remind us of the Holly, but it is occasionally thinner and less upright in growth. The young fronds appear early in spring, among the yet verdant fronds of the former year. They rise in a tuft from the extremity of a scaly rhizome, and their outline is narrow, linear, and tapering at the upper part. They are pinnate, with short crowded overlapping twisted pinnæ, which are somewhat crescent-shaped; the upper side having at the base an ear-shaped projection, while the lower side has the appearance of having had a piece cut out. The veins are twice or thrice branched, reaching nearly to the margin, without uniting with others. The

indusium is a membrane-like scale, and the clusters of fructification form a continuous line on each side of the midrib, and even with it. They are often very numerous on the upper pinnæ.

The Holly Fern is very difficult of cultivation. It is called by some writers *Aspídium Lonchítis*, and by others, *Polypódium Lonchítis*.

2. *P. aculeátum* (Common Prickly Fern).—*Fronds* rigid, linear, or lanceolate, twice pinnate; *pinnules* acute, running down the stem. This is quite a common fern, one which is found almost throughout the kingdom on hedgebanks and shady places, its dark green and handsome fronds contrasting with the brighter tinted Hart's-tongue Fern, or the feathery grasses beside it. It grows also in woods, but is seldom seen on the open heath, or alpine hill. It is a conspicuous plant, its fronds growing in circular clumps, and often two feet long. They are at first nearly upright, but when fully grown, they spread out like a coronal from a thick tufted stem. They are lanceolate in form, and when luxuriant are broad, but their outline varies much in different situations, and often even in plants of the same tuft. The texture is rigid, the stalk usually short, and thickly clothed with membranous scales of a rust colour. In April and May the fronds are some of the prettiest of the green things of the hedgerow, their pale green scrolls drooping downwards in most elegant forms. By midsummer these are fully developed, while, by the middle of August, the upper part of the fronds is usually profusely crowded with dark masses of fructification, and neither summer's sun nor winter's frost



COMMON PRICKLY FERN



SCALE-LEAVED PRICKLY FERN.

Polystichum angulare

seems to tinge their full dark green hue with a tint of decay. They are twice pinnate, their pinnæ alternate, and again divided into pinnules, which run down closely together, gradually merging into the rachis; or they taper to a crescent-shaped base, and are attached to the rachis by the point of the crescent, the upper base being thus extended into an ear-shaped lobe, and the lower base shaped as if an arched piece had been cut out of it. In young plants the pinnæ are serrated or pinnatifid, or with one or more pinnules distinct. The pinnules have a long spine at their points, and smaller spines down the margin, and a few of the lowest are often slightly stalked. The veins are branched alternately, not uniting, but free to the margin. The clusters of fructification form a line on each side of the midrib of the pinnules, and on the larger pinnules on each side of the mid-vein of the ear-shaped lobes.

A variety of this fern, called *P. lobatum*, was, until recently, regarded as a distinct species. It is characterised by the more narrow outline of the frond, and by being simply pinnate, its pinnæ lobed or pinnatifid; it is also of more rigid texture.

3. *P. anguláre* (Willdenow's Fern, Angular-lobed Prickly Fern, or Soft Prickly Shield Fern).—*Fronds* lax, drooping, lanceolate, twice pinnate; *pinnules* distinctly stalked, bluntish. This beautiful plant, gracefully waving to every summer wind, is one of the most elegant of our ferns, and happily may be numbered among the common plants of our woods and hedges, though it is not so general as the last species. It has a very vigorous appearance, is of a deep green hue, and

mostof the fronds retain their greenness even in winter. The stalk, which is about one-fourth of the length of the frond, is covered with a thick mass of scales of a rust-red colour. The young unfolded plants are, in spring, quite clothed with them, and in the older plants they extend more or less throughout the rachis. Large circular clumps of this fern attract the eye by their beauty of form and attitude, as well as by their large size; for they are occasionally four or five feet in height, though more frequently about two. They have not the rigid aspect of the last species, but are softer and bending. The form of the frond is lanceolate and twice pinnate, the pinnæ being very numerous, long, and tapering in form, distinct, and often distant from each other. The pinnules are flat, somewhat crescent-shaped, sometimes blunt and sometimes acutely pointed, some of the lower pinnules having deep lobes so as to be pinnatifid. They are distinctly stalked, and serrated at the margins, a little spine surmounting each serrature. The under surface of the frond is of a delicate sea-green colour, with small, brown, chaffy scales about it. The upper surface is of a deeper hue, but not of a full green tint. The pinnules taper to a broad angled base, and are attached to the rachis of the pinnæ by a short and slender stalk. A very elegant variety, called *P. subtripinnátum*, has its pinnules at the base very deeply lobed; and a form termed *P. angustátum* has all its pinnules narrow and acute.



BRITTLE BLADDER FERN.
Cystopteris fragilis

7. Cystópteris (Bladder-fern).

1. *C. frágilis* (Brittle Bladder-fern).—*Frond* lanceolate, twice pinnate; *pinnæ* lanceolate; *pinnules* oblong, rather narrowed below, deeply pinnatifid; *segments* sharply toothed or serrated. This fern, like all the other species of the genus, is fragile and delicate in texture, their membrane-like nature readily distinguishing the Bladder-ferns from most of our native plants. The beautiful little species called Brittle Bladder-fern varies very much in form and in some of its distinctive features, always, however, retaining its fragile nature. Its fronds, which are from five or six inches to a foot high, grow in tufts. The stalk is erect, slender, glossy, of a purplish black colour, with a few scales at its base. The variable fronds may be generally described as lanceolate and twice pinnate, having in most specimens their pinnules pinnatifid. Owing to their thin texture the veining is very apparent. From a somewhat winding mid-vein a lateral branch runs into each of the lobes; this again branches into smaller veins, almost every one of these bearing a cluster of capsules at about the middle of its length. The cluster, which is of roundish form, has a loose white membranaceous indusium, attached by its broad base at one side only, beneath the cluster. It soon tears into jagged segments, curling under at the part which is jagged, and finally disappears altogether. The roundish form of the indusium in the genera *Lastréa*, *Polystichum*, and the Bladder-ferns, led earlier botanists to include them all in the *Aspídium*, or Shield-fern genus. In *Cystópteris*, however, the indu-

sium is hooded, and not round and flat, and it is also sufficiently like a bladder to have given this name to the plants. The clusters of capsules are at first distinct, but they increase very rapidly, in some cases finally crowding into a mass.

This fern is very widely distributed throughout the United Kingdom, preferring moist rocky places and walls in mountainous districts, and attaining the greatest luxuriance on limestone soils. It forms most beautiful patches of somewhat pale green verdure, springing from rocky crevices, its numerous fronds growing in tufts from its rhizome, and its black and wiry roots penetrating into the clefts. This plant has received much attention from botanists, as it has several forms or varieties, which are however intimately connected. That termed *C. angustáta*, which is the most distinct, is, however, by some writers on ferns, considered as a variety of *C. dentáta*. The frond in this variety is oblong-lanceolate, twice pinnate; the pinnules linear lanceolate, more or less forming a wing, acutely pinnatifid or toothed. It is rather longer than the ordinary form, and tapers more towards the point of the frond, and also towards the points of the pinnæ. The Brittle Bladder-fern has been termed *Cýstea frágilis*, *Cyathéa frágilis*, or *Polypódium frágile*.

2. *C. dentáta* (Toothed Bladder-fern).—*Fronds* oblong-lanceolate, twice pinnate; *pinnules* egg-shaped, obtuse, bluntly-toothed. This plant is so similar to the Brittle Bladder-fern that some writers describe it merely as a variety of that plant, but Mr. Babington and several of our recent writers on Ferns consider it a distinct



1 TOOTHED BLADDER FERN.
Cystopteris dentata

2 DICKIE'S D.
C. Dickieana

species. It is a smaller plant, its pinnæ being more horizontal in form, and all its parts more blunt. Its veining is similar, but the fructification is at the termination and not near the middle of the secondary vein, and is thus more distinctly marginal. The clusters are at first separate, but as they ripen they run into a mass, and form a brown ridge on the under surface of the pinnules. This constitutes a very marked difference between this and the Brittle Bladder-fern. The smooth slender rachis is almost always of a brownish purple colour.

This Toothed Bladder-fern is not uncommon in the North of England, as about Settle, in Yorkshire, at Cauldron Snout, Durham, and various other localities. It is found, too, near Matlock Baths, on the Cheddar Cliffs, at Tunbridge Wells, and numerous other spots throughout the kingdom where the the soil is rocky, though it is probably often overlooked and mistaken for *Cystópteris frágilis.*

A most marked variety of this fern, termed *Dickieana*, has a very compact frond, and is a very beautiful plant, of a deep green colour, and almost transparent texture. The general outline is nearly egg-shaped, but terminating in a point, and the pinnæ are egg-shaped and lanceolate, overlapping each other, the pinnules running closely together so as to form a wing. They are broad and blunt, with a few shallow marginal notches, and the fructification is also marginal. Dr. Dickie discovered this remarkable variety in 1846. He found it growing in a sea-cave near Aberdeen. No other native locality of this plant is recorded, but it is

well known to the cultivator of Ferns, retaining its peculiarities in the greenhouse or closed case. Its height varies from about four to six inches. The *Cystópteris dentáta*, besides being often described as a variety of *C. frágilis*, is also called by different botanists *Cyathéa dentáta*, or *Cystea dentáta*.

3. *Cystópteris montána* (Mountain Bladder-fern, or Wilson's Fern).—*Fronds* triangular, thrice pinnate; *pinnules* of lower pinnæ pinnate; *lobes* pinnatifid, with linear notched segments. This fern, which is of very elegant form, is the rarest of all our British species. It is very distinct from the preceding, and its small triangular very compound fronds are from four to six inches high. It has a slender creeping scaly underground stem, with dark wiry roots. The stalk is about twice as long as the leafy portion of the frond, the pinnæ are opposite to each other, and the lower pair are much longer than the others; these gradually diminish in size towards the upper part of the frond. This plant is exceedingly frail and delicate, almost transparent in texture, and it is one of the most compound of our British Ferns. The lower part of the frond is thrice, and the upper part twice pinnate, and it has the peculiarity of having the lower side of the lower pinnæ broader than the uppermost side, and some of the upper branches sometimes exhibit this inequality. The lower pinnæ are divided on the lower side into pinnules, which are egg-shaped or lanceolate in form, and these are again divided into pinnules, which are egg-shaped or oblong and notched, the pinnules on the upper side being of the same form as the secondary pinnules of the lower side.


1
2
MOUNTAIN BLADDER FERN
Cystopteris montana
2 ALPINE B F
C alpina

In the next pair of branches the lower pinnules are similar to the secondary pinnules of the lower branches, and after that the parts gradually lessen towards the upper portion of the frond.

The mid-vein of the pinnules is somewhat winding, giving out alternately lateral veins, each of which ends in the part of the margin between two notches; at the back of each side vein is placed the roundish capsule cluster, covered by the concave indusium with its jagged edge. The clusters of fructification are very numerous and distinct.

This Bladder-fern is a common plant on many rough and stony grounds of other countries, its geographical range being extensive. It was found on Ben Lawers, in 1836, by Mr. Wilson, when with Sir W. J. Hooker and Professor Graham he visited that spot, and it has since been found in several places on the mountains of Perthshire and Forfarshire, but nowhere in great abundance. It is by some writers termed *Polypódium montánum, Aspídium montánum, or Cyathéa montána.*

4. *C. alpína* (Alpine Bladder-fern, or Laciniated Bladder-fern).—*Fronds* lanceolate, twice pinnate; *pinnules* deeply pinnatifid, partly cloven, and slightly toothed at the end. This plant, which is a doubtful native, is the loveliest of this exquisitely beautiful genus. It formerly grew in abundance on an old wall at Low Leyton, in Essex, whence however it is almost if not quite exterminated, as the wall was some years ago repaired, though a few specimens of the plant have since been found near the old spot. Sir Wm. Hooker and Dr. Arnott, who examined specimens of the Leyton Fern, pronounce

it to be identical with the Continental species. Its fronds, which are very numerous, grow in tufts. They are usually about four or five inches high, but are sometimes twice that height, appearing in May, but, like their equally delicate congeners, dying away with the earliest frosts of autumn. The lanceolate frond is twice pinnate, and the pinnules are often so deeply pinnatifid as to be almost distinct. The branches, which are nearly opposite, with a winged rachis, are egg-shaped, and divided into bluntly egg-shaped pinnules, these pinnules being again cut down almost to the mid-vein into short blunt lobes, which are partly cloven, and slightly toothed at the end. The mid-vein of the pinnules is distinct and nearly straight, with a side vein, either simple or divided, issuing into each lobe, one branch extending to the point of each marginal serrature. Numerous rounded clusters of capsules lie near the margin, covered with their hooded indusia.

This fern has been called *Cystópteris régia*, *Cyathéa régia*, or *Cyathéa incísa*, *Cýstea régia*, *Polypódium alpínum*, *P. trífidum*, or *Aspídium régium*.

8. Athýrium.

1. *Athýrium Fílix fœmina* (The Lady Fern).—*Frond* lanceolate, twice pinnate; *pinnules* deeply cut or pinnatifid; *lobes* sharply toothed. This fern, whose graceful attitude and elegant outline won for it its distinctive name, is indeed the loveliest of all our larger ferns. It grows abundantly in many sheltered and moist woods, attaining there its greatest luxuriance, and its somewhat pale green fronds arising in such places to the height of



LADY FERN

three or four feet. It may often be seen, too, gracing spots of another character, for the slopes of grassy hills are not without its clumps, and sometimes it bows to the wind which bends also the blue-bells as it rushes over the heathland laden with the fragrance of the wild thyme.

Walter Scott, alluding to this plant in Waverley, mentions its love for the moist shady woodlands :—

"Where the copsewood is the greenest,
Where the fountain glistens sheenest,
Where the morning dew lies longest,
There the Lady Fern grows strongest."

Calder Campbell, too, in some lines which he has written for this volume, well describes such a spot as the Lady Fern delights to haunt :—

"If you would see the Lady Fern
In all her graceful power,
Go look for her where the woodlarks learn
Love-songs in a summer bower;
Where not far off, nor yet close by,
A merry stream trips on,
Just near enow for an old man's eye
To watch the waters run,
And leap o'er many a cluster white
Of Crowfoots o'er them spread;
While Hart's-tongues glint with a green more bright
Where the Brackens make their bed:
Ferns all—and lovely all—yet each
Yielding in charms to her
Whose natural graces Art might teach
High lessons to confer.

"Go look for the Pimpernel by day,
For Silene's flowers by night;*

* *Silene nutans*, the Nottingham Catchfly, and *Silene noctiflora*, the Night-flowering Catchfly, expand only at night-time.

For the first loves to bask in the sunny ray,
And the last woos the moon's soft light:
But day or night, the Lady Fern
May catch and charm your eyes,
When the sun to gold her emeralds turn,
Or the moon lends her silver dyes.
But seek her not in early May,
For a Sibyl then she looks,
With wrinkled fronds that seem to say,
'Shut up are my wizard books!'
Then search for her in the Summer woods,
Where rills keep moist the ground,
Where Foxgloves from their spotted hoods
Shake pilfering insects round;
Where up, and clambering all about,
The Traveller's Joy flings forth
Its snowy awns, that in and out
Like feathers strew the earth:
Fair are the tufts of Meadow-sweet
That haply blossom nigh;
Fair are the whorls of violet
Prunella shows hard by;
But nor by burn, in wood, or vale,
Grows anything so fair
As the plumy crest of emerald pale,
That waves in the wind and soughs in the gale,
Of the Lady Fern, when the sunbeams turn
To gold her delicate hair!"

The Lady Fern is very generally distributed throughout England, and is still more common in Ireland, where it abounds on almost all the bogs. The light and arrowy fronds arise in circular tufts from the rhizome. This is very large, extending itself some inches above the surface of the earth, and forming a base to the slender fronds. During early spring, when we wander into the woods for violets and primrose

buds, we see numbers of little undeveloped fronds coiled up and thickly covered with their light brown scales, peeping from among the decayed leaves, which will soon be swept all away by the spring breezes. By the end of April, when the primrose needs no longer to be searched for, these little scrolls are unfolding too, and then they hang down, forming the figure of the shepherd's crook, a dozen or more of the young fronds often in one clump. They live throughout the summer, towering above the hedge or woodland flowers, but they cannot bear the frost. There are several varieties of the Lady Fern. In the common form the lanceolate frond has a stalk usually about a third of its whole length, and is scaly at the base. It is twice pinnate, the pinnæ being lanceolate and generally tapering. These are always again pinnate, the bases of these pinnules being sometimes connected by a narrow wing. The pinnules are lobed, often so deeply cut as to be pinnatifid, and the lobes are sharply toothed. The veining of this fern is very distinct. A mid-vein winds through each pinnule, alternate smaller veins arising from it, and these being again branched in an alternate direction. On the lowest branch, on the side nearest the top of the pinnule, about midway between the mid-vein and the margin, is the oblong slightly curving cluster of capsules, covered by the indusium of the same form. Both the cluster and its covering, on the maturity of the capsules, contract at the ends and swell in the middle, thus becoming more curved, and assuming a more roundish form than in an earlier stage; the indusium also is then kidney-shaped. On one side

the indusium is attached to the side of the vein on which it is seated; while on the other side, that which is towards the mid-vein, it becomes free, and is torn at the edge into thread-like segments. The fructification is so abundant, that Sir J. E. Smith has remarked of this fern, "that if a single plant were uninterrupted in its possible increase for twenty years, it would cover an extent equal to the surface of the whole globe." In Ireland, where it is common on all the bogs, this fern is used for packing fruit, as we in England use the common Brake. It is sometimes used also by fishermen, for Mr. Newman remarks of the plant, "On landing at Warren Point, near Newry, I was rather surprised to see what quantities of it were employed in packing the herrings there exhibited for sale."

This is a most variable fern, and some of its many varieties are regarded by botanists as permanent, and so distinct as to deserve to be classed as species The variety *A. latifólium* is one of these. It is a much less delicate plant than the ordinary form. Its frond is lanceolate, somewhat oblong; its pinnules are broad, leafy, and set more closely together, lobed and deeply toothed at the edges, with the curved clusters of capsules lying near the hollow between two lobes. It has been found near Keswick, in Cumberland. It is probable that it only acquires its peculiarities from the situation in which it grows.

The variety termed *A. convéxum* is very distinct. It has more slender fronds than any other form of the Lady Fern, and its pinnæ and pinnules are smaller. The narrow lanceolate frond is erect, and rarely more than



LANCEOLATE SPLELNWOLT,
Asplenium Lanceolatum

two feet high ; the pinnæ are taper, pointed, and the very narrow pinnules end in a sharp point. Their edges, which are somewhat bluntly toothed, are rolled under so as almost to hide the serratures.

The variety *A. molle* has a short stalk, with broad and short scales. The frond rarely exceeds a foot in height, and is usually erect, and of a bright green colour. Its outline is egg-shaped and lanceolate. It is pinnate, having its lower pair of pinnæ short and turning downwards. The pinnules are flat and toothed, and connected at their base to the midrib by a narrow wing. The clusters of fructification are distinct.

Other forms are produced by culture, some of which are very singular. Thus the variety *multífidum* has the tips of the frond and of the branches cut into numerous segments so as to form a tassel. This, too, is the case with a dwarf variety termed *críspum*, which, with its tasselled fronds, looks in the closed case like a clump of parsley. This form was first found on Orah Hill, Antrim, Ireland, and has since been gathered from Braemar, in Scotland. The Lady Fern was formerly called *Polypódium Filix-fœmina*, and later botanists have termed it either *Aspídium*, or *Aspléniun Filix-fœmina*.

9. Aspléniun (Spleenwort).

1. *A. lanceolátum* (Green Lanceolate Spleenwort).—*Fronds* lanceolate, twice pinnate ; *pinnæ* egg-shaped and lanceolate ; *pinnules* toothed or lobed ; *clusters of fructification* nearly marginal. This is one of the most elegant of our British ferns, and one of the few which

thrive best near the sea. Though not exclusively confined to the sea-coast, it is far more frequent there than on inland soils, and at Penzance, in Cornwall, is one of the most common plants, springing out of every wall, and being as general on the hedge-bank as the primrose. It is abundant at St. Michael's Mount, but nowhere in England grows to so large a size as among the damp rocks of the Lizard Point. It is also luxuriant at Torquay, in Devonshire. Sometimes this fern, like other plants which frequent the sea-coast, flourishes on high mountains, and the botanist has welcomed its green fronds on the heights of Snowdon. Some summers since, it grew in profusion on the high rocks at a short distance from Tunbridge Wells; but as that neighbourhood has, by its rare plants, attracted the attention of many botanists, and as fern lovers are sometimes not so considerate for others as they should be, it became less abundant, and perhaps may be by this time altogether eradicated by the heedless waste with which it was gathered. It is a plant of but local occurrence, even on the sea-coast, growing only on the southern and western coasts of England and Wales, but it is plentiful in the Channel Islands. Its long black wiry roots penetrate far into the fissures of rocks. The young fronds appear in May, are matured by August, and remain green through the winter. The underground stem is brown, tufted, and densely clothed with a mass of bristle-like scales. Similar scales are scattered here and there on the stalk of the frond, which is black at the base. In the most luxuriant specimens the frond attains the height of a foot and a half, but its average

size is from six to eight inches. The outline is lanceolate; the stalk about a third of its length. It is very similar to that of the species yet to be described, the Black Spleenwort, but its outline differs in this respect. The form of the Black Spleenwort is always triangular and broadest at the base; but that of the Green Lanceolate species is truly lance-shaped, tapering from near the middle towards the base. The frond is twice-pinnate; the pinnæ are generally, but not always, opposite, and egg-shaped and lanceolate in form. The pinnules are usually inversely egg-shaped, and have the margins serrated with deep teeth; the larger pinnules being cut into toothed lobes.

The pinnules of this fern have a winding mid-vein, the lateral veins are branched, one of the smaller of these branched veins extending to each serrature of the margin, and the fructification being placed near the extremity, but not in a very regular manner. Each cluster of capsules is at first long and narrow, and covered with a linear white indusium. This soon disappears, and the clusters crowd ultimately into roundish masses.

2. *A. Adiántum-nígrum* (Black Spleenwort).—*Fronds* triangular, twice or thrice pinnate, *pinnæ* and *pinnules* triangular, and sharply-toothed. This is a frequent and ornamental fern, gracing the time-stained walls of many an old church or ruin, or hanging down its graceful sprays over rocks, or on the hedgebank of the dry but shady lane. It varies somewhat in form under different circumstances; it has generally a very elongated triangular outline, the lowest pair of pinnæ being larger

than the others. When growing in dry and open places, it is smaller and more blunt in all its parts than when among the bushes of the shadowed lane. It is among the latest of our Ferns in unfolding its fronds, which are often not open till the middle of June. They are at first quite erect, forming little tufts, but they gradually lengthen and curve gracefully downwards, retaining their elegance of shape, and even their green hue and fructification, through the winter. The stalk is brown and glossy, about a third of the length of the frond, and has upon it small bristle-like scales, which are also to be found on the rachis. This frond has its branches also of a triangular form, pinnate, and the pinnæ alternate, drawn out usually at the top into a long point; each pair gradually lessening from the base towards the top of the frond. The pinnules, too, are triangular and alternate, the lower being deeply-lobed and serrated at the margin.

The fronds of the Black Spleenwort are not crisp and brittle like those of many ferns, but have a tough and leathery texture, and are much veined. The winding mid-vein of each pinnule is very distinct, and from it issue veins which are either simple or forked; one of these lesser veins extending to each point of the serrated margin, and bearing the cluster of capsules. The same mode of veining is apparent also in the ultimate divisions of the frond, as well as in the larger lobes, and these bear the clusters near the point at which they unite with the mid-vein, so that the clusters are placed near the centre of every pinnule or lobe. In an early state the clusters are distinct, and are long and narrow; but as



BLACK SPLEENWORT.
Asplenium adiantum nigrum

SMOOTH ROCK
A. Fontanum

they mature, they form one dark-brown thick mass, almost covering the whole of the under-surface of the frond. The indusium is present only in an early stage of their growth; it is white, and has an undivided margin.

When this fern varies into a much more blunt form, it constitutes the variety called by botanists *obtusum;* while sometimes, especially when growing in very shady places, it assumes a more slender and tapering shape, and is called *acutum;* both these forms are rare in this country, though on the Continent they seem well known, and are considered so permanent that they are described as species.

The French call the Spleenwort *Doradille;* the Germans, *Streifenfarren;* the Dutch, *Miltkruid;* the Italians and Spaniards, *Asplenio*. It is a common plant on rockwork in gardens, and very well adapted to it; but its fronds do not become large unless it grows in shade. It does not thrive so well in the closed case as in the open air.

3. *A. fontánum* (Smooth Rock Spleenwort).—*Frond* linear-lanceolate, twice pinnate; *pinnæ* oblong, somewhat egg-shaped; *pinnules* wedge-shaped and toothed. This is a very rare fern, mentioned by our older botanists as occurring on places on which it is no longer to be found. It was described by Hudson as growing near Wybourn, in Westmoreland. It also formerly grew on the walls of Amersham Church, in Buckinghamshire. It has of late years been found at Matlock, in Derbyshire, on a very old wall at Tooting, also on a rock at Stonehaven, and very recently by the Rev. W. H. Hawker, growing in some quantity on a very old wall

near Petersfield, in Hampshire. It has been regarded as a doubtful native, or as probably extinct, but is very likely to be found in other places now that so much attention is given to ferns by our ablest botanists. It is not unfrequent in continental countries, in rocky places. This Spleenwort is a very distinct and handsome little fern, its thick rigid fronds growing in small tufts to the height of three or four inches. The upper surface of the frond is deep green, but the under part is of a pale whitish green, and it retains its colour throughout the winter. The outline of the frond is narrow lanceolate, the stalk very short, and scaly at the base. It is twice pinnate, the pinnæ being oblong egg-shaped, and the pinnules inversely egg-shaped, somewhat wedge-shaped, tapering towards the base, and toothed at the margin. Both the principal stalk of the frond, and the partial stalk of each branch, have a narrow leafy wing throughout their length. This forms a distinctive feature of the fern.

The texture of the fern is too substantial to allow the veining to be very apparent. The chief vein of each pinnule sends out a vein towards each lobe or serrature, and in the larger pinnules some of these lateral veins become forked, a vein running into each lobe or notch. An oblong cluster of capsules is seated on two or more of these veins, and covered with an indusium of a similar form, waved and indented at the edge. The clusters are rarely distinct, but generally form a brown mass on the under-surface of the pinnules.

This fern is described by various botanists as *Aspídium*, *Athýrium*, or *Polypódium*; retaining, however, in each case its specific name of *fontánum*.


2
3

4. *A. Rúta-murária* (Wall-rue Spleenwort, or White Maiden Hair).—*Fronds* twice pinnate; *pinnules* lobed, or bluntly-toothed. This is a plant often seen and easily recognised. It is a common fern in Scotland, Wales, and Ireland, and is generally distributed throughout England, though less common in the eastern counties than elsewhere. Its native haunt seems to be the rocky hill, where its little fronds cluster above the fissures of the stone; but the wind scatters its dust-like seeds, and they find a congenial soil on the stone pinnacle or tower of the ancient church, or on broken archway or brick wall, where we may often find them with their companions the green Pellitory, or the golden Wall-flower. The plant seems to love the haunts of man, for it is far less frequently found on the wild rock than on the walls which his hands have reared. It grows, however, in luxuriance on the fissures of the rocks about the Peak in Derbyshire, and is abundant on the craggy hills of Arthur's Seat, in Edinburgh. Its fronds, which are thick and leathery, appear in May and June, and by September are thickened by the dark-brown mass of fructification beneath. The form of the plant would at once recal to memory that of the Common Garden Rue. The frond is usually triangular, the stalk of a dark purplish brown colour, slender, and glossy; the leafy part occupying rather more than half its length. The fronds are most commonly three or four inches long, but, when most luxuriant, attain the length of half a foot. They are twice pinnate, the pinnules being alternate and pinnate, of a roundish egg-shaped form, bluntly wedge-shaped, and on short stalks, and the

colour is either dark deep green, or sometimes of a sea-green tint. When growing on exposed spots, they are covered with sea-green powder. Some of the larger fronds are again divided, and their pinnules cut down nearly to the mid-vein, the lobes having the usual form of the pinnules. Little tufts of this plant, however, may be found in which the fronds are pinnate only, with pinnatifid pinnæ. The pinnules of this fern are like little leaves, each on a stalk, and with the upper margin irregularly toothed.

There is no mid-vein in the pinnules of this fern, but the veins radiate from the stalk towards the margin in a fan-shaped direction, and on them are borne the narrow lines of the clusters of fructification; these are at first covered by a membranous indusium, the free margin of which is jagged and uneven. As the capsules increase in size, the indusium turns back and finally disappears.

This fern is sometimes called *Scolopéndrium;* or *Amésium Rúta-murária;* and one of its old English names, White Maiden Hair, was probably given because of the light-coloured powder sometimes seen on its fronds. It was of old renown among the herbalists as a cure for coughs, and affords a slight degree of mucilage.

5. *A. Germánicum* (Alternate-leaved Spleenwort).—*Fronds* simply and alternately pinnate; *pinnules* narrow, wedge-shaped. This is one of the rarest of British ferns, and is found on rocks in a few places in Scotland and the north of England. It was formerly considered but a variety of the Wall-rue, but its characteristics seem quite distinct and permanent. The frond, which

is about three or four inches high, and of a bright green colour, is long and narrow, and pinnated with distinct, alternate, wedge-shaped pinnæ. The upper pinnæ are slightly lobed, becoming more lobed towards the base; their upper ends are in every case toothed or notched.

The fronds grow in tufts, are thick and tough in texture, and have no distinct mid-vein; but a vein from the base of each pinna, or lobe, branches off two or three times as it reaches the broader parts, the veins forming a fan-like figure, being in the larger pinnæ seven or eight in number, and four in the smaller ones. Two or three lines of fructification are on each pinna, and are covered by an arched indusium, the margin free and slightly waved, but not torn; the clusters finally run into one thick mass. This plant is, by some writers, called *Asplénium alternifólium*, or *Amésium Germánicum.*

6. *A. septentrionále* (Forked Spleenwort).—*Fronds* 2 or 3-cleft; *segments* linear; *margin* sharply-toothed. This is a rare fern in this country, though occurring in a few localities in abundance, as among the fissures of the rocks of Arthur's Seat, Edinburgh. It grows, too, on some mountains at the north of the kingdom, as at Ambleside, where it is found among the rocky clefts; but Mr. Newman says, that he has seen it in greater luxuriance at Llanrwst, near the mouth of the Conway, than in any other place. This plant grows in tufts, and, notwithstanding the diminutive size of the individual fronds, occasionally thus forms large masses. Mr. Newman says, "At Llanrwst, the tufts of this fern were very large; one of them was so heavy, that after

shaking out all the loose earth, I found it a very inconvenient load to carry, even the single mile which I had to convey it. This tuft, consisting, I suppose, but of one rhizoma, had upwards of three hundred perfectly vigorous fronds, besides at least an equal number of decaying ones, the relics of the previous year." The fronds are usually two, three or four inches in length, slender and forked, so as to resemble the horns of a stag; easily distinguished by their shape from any other fern, reminding one of the leaves of that common plant, the Buck's-horn Plantain (*Plantágo corónopus*). The veins are few and little branched, one running into each lobe. The clusters of capsules lie in lines, in a very crowded manner, on each side of the vein. They are, at first covered by a linear-shaped indusium, which bursts open as the capsules mature, and then gradually disappears. The whole under-surface of the frond is finally covered with the brown mass of fructification.

This fern has by various writers been called *Scolopéndrium septentrionále*, *Amésium septentrionále*, or *Acróstichum septentrionále*. The beautiful Elk's-horn Fern, of which we read so much in the works of travellers in Australia, is the *Acróstichum alcicorne*. This Stag's-horn Fern grows on the timber-trees of the forest to a great size, resembling in its shape the palmated antlers of the moose and rein-deer. Mr. Backhouse describes it as sometimes growing on decomposing sandstone rocks, forming protuberant girdles around trees, from which hang the most beautiful flowers of convolvuli.

7. *A. marínum* (Sea Spleenwort).—*Fronds* pinnate; *pinnæ* oblong and blunt, stalked, unequal and wedge-

shaped at the base. This beautiful fern grows out from the sides, or hangs its numerous sprays down from the summits, of sea-caves, rocks, or cliffs. Its deep rich tufts of evergreen fronds attain, when most luxuriant, the length of a foot and a half, but it varies greatly in size. It is abundant on maritime rocks in the south-west of England, and is plentiful in the Channel Islands, as well as on the coasts of France and Spain. The specimen from which our illustration was made was gathered from the rocks, on the sea-shore under the Hoe at Plymouth. In Cornwall this fern is often a beautiful object. It grows, though very rarely, on inland situations, on walls and rocks. The frond unfolds in July, bearing its fructification in September and October. Its form is linear, simply pinnate; its pinnæ are stalked and serrated, and connected at the base by a narrow wing, extending along the rachis. The pinnæ are not always alike in shape, some being oblong, others egg-shaped; they are unequal at the base, the side nearest the upper part of the frond being much developed, while the lower portion looks as if a piece had been cut off. The margins have either rounded or pointed serratures. The general appearance of this handsome fern is so unlike any other British plant, that it is easily distinguished. Its upper surface is of a deep glossy green, its under surface is paler. In the hothouse it attains much greater luxuriance than in its wild state.

The Sea Spleenwort has long been used medicinally. It is somewhat mucilaginous, and was formerly considered a good application to burns. Like all the species des-

tined to grow on rocks, it has tough wiry stems, which penetrate into clefts, and hold the plant so firmly there that it is difficult of eradication. The rhizome is short, and the fronds often grow from it in tufts. The veining may be usually readily seen. Each pinna has a mid-vein, which gives off lateral veins, these again sending off others. The clusters of capsules lie on that side of the lateral veins which is nearest the upper part of the pinnule, forming bright rust-coloured lines, often of an oblong form. These are covered by an indusium, which bursts open as they ripen.

A Sea Spleenwort, called *Asplénium diformе*, very much resembling our native species, is found on the rocky coasts of New Holland. Mr. Backhouse remarks of this plant:—"It becomes more narrow when growing further from the sea, and the leaves become more divided, and are separated into such narrow segments, that the lines of fructification are thrown upon their margins; it then becomes *Cænópteris odontítis*, but every possible gradation is to be met with between this state and that in which it grows on rocks washed by the sea."

8. *A. víride* (Green Spleenwort).—*Fronds* linear, pinnate; *pinnæ* alternate, roundish, egg-shaped, wedge-shaped at the base, bluntly serrated. This very pretty little fern varies much in size, according to the situation on which it grows. It is so like the Common Wall Spleenwort that it might at first be mistaken for it, but it may be distinguished by the colour of its slender rachis, which is green, while the stalk of the Wall Spleenwort is throughout of a purplish-black, and by the rounded notches on the margins of its leaf-like



1. A SPLEENWORT
Asplenium marinum.

2 GREEN S
A. viride



1 COMMON WALL SPLEENWORT
Asplenium trichomanes

2 DITTO
Var incisum

pinnules. This fern is very frequent in the Highlands of Scotland, growing on moist rocks, into whose crevices it sends its wiry fibres. Its hue is brighter and of a lighter green than the other British species of the genus. Though the upper part of its stalk is yellowish green, yet it gradually deepens in hue towards the lower parts, becoming at its base of a purplish brown. The stipes is about a third of the length of the whole frond, and the plant grows in tufts. The simply pinnate leafy part is from two or three inches to a foot long, narrow, and the small roundish egg-shaped pinnæ rather tapering towards the base, and attached to the rachis by the narrow part, which becomes gradually narrower. The veining of the fern is distinct. A number of lateral veins rise alternately from the mid-vein, and are either simple or forked. The capsule clusters lie on the side nearest the top of the pinna; they are oblong, and covered at first by oblong membranous indusia, jagged or notched, which soon fall. The fructification then forms a dark brown mass all over the middle of the under side of the fern, concealing the mid-vein. This fern, which is found on the mountainous districts of England, Wales, and Ireland, occurs in similar moist rocky places throughout Europe. Linnæus termed it the Branching Trichomanes, because its fronds have a tendency to divide into a branched form.

9. *A. Trichómanes* (Common Wall Spleenwort).—*Frond* linear, pinnate; *pinnæ* roundish, egg-shaped, stalked, wedge-shaped below. This is one of our most common ferns; and it is a graceful plant when growing, as it often does, in large quantity. Now and then we

find its deep green sprays making a light tracery over some sloping hedgebank, on which the sunshine is not interrupted by overshadowing boughs. More often, however, the old church tower or stone wall is enlivened by its clumps of slender fronds, or they give to the ruin a touch of verdure; and throughout the year we may gather it from some shady rock, its evergreen fronds, when in a thriving condition, becoming a foot in length. The stalk is throughout the frond of a purplish glossy black. The frond is dull green, its small pinnæ are of equal size, very numerous, and in some cases quite distinct, in others closely crowding on each other. They are of a roundish oblong shape, and are attached by a short stalk, wedge-shaped below, and formed as if a piece had been cut off. The pinnæ are jointed at the main stalk of the frond, and when old, fall off and leave it naked, numbers of the black glossy hair-like stalks mingling with the green fronds. A mid-vein in the pinna gives rise on each side to forked veins; and the linear cluster of capsules is placed just within the margin of the pinna, on that vein of the fork which is nearest its upper part. These clusters are, when young, covered by a thin indusium, with its margin free and notched; but as they ripen, they sometimes run into one mass, covering with their dark brown hue almost all the under surface of the pinna, though more frequently lying in two distinct portions, and leaving the midrib uncovered.

This fern is not subject to many varieties, except that it differs greatly in the length of its fronds according to the place of its growth. A form, however, termed



HARTS TONGUE SPLEENWORT ½ Nat. size
Scolopendrium vulgare

incísum, has its pinnæ cut into narrow notched segments almost to the midrib. This fern is common, not only throughout this kingdom, but throughout Europe. A tea and syrup made of its fronds have long been used as a remedy in pulmonary affections. It is by some writers called *A. melanocaulon*.

10. Scolopéndrium (Hart's-tongue).

1. *S. vulgáre* (Common Hart's-tongue).—*Frond* oblong, strap-shaped, simple; *base* heart-shaped. To those accustomed to wander about our green lanes and fields, no fern will less require a minute description than this. Its general features are known not alone to the botanist, but to every observer of plants, and it varies under any circumstances, too little from its ordinary form to make it difficult of recognition. Its clumps of long, slender, bright green leaves, with a surface so glossy that the raindrop runs off them, gather on sunny hedgebanks in almost every rural district of our land, and are still more often to be found on the moist and shady sides of woods, among the long grasses, or coarse herbage, or the tall stems of wild flowers. The clumps are circular, the fronds spreading out from the centre, and gracefully curving downwards. In May, when the hedges are full of blue-bells, and anemones, and rosy cranesbills, the young fronds may be seen daily uncoiling somewhat further, till all traces of their scroll-like form are lost, save a little curl at the tip of the frond, which in a few days is levelled too, and the pale green colour of the young frond gradually assumes its richer verdure. In June and July the Hart's-tongue fern is very bright

and beautiful, of a delicate and tender green, quivering before the rough winds, but of too firm a texture to be stirred by a light summer's breeze. The frond is long and narrow, tapering and acute at its upper end, and again gradually lowering at the base, when it becomes very distinctly heart-shaped. Its margin is entire and waved, the leafy portion being placed on a short and shaggy stalk, which is of a purplish brown colour at the base. While the frond is young, it has a downy or cottony substance on its under side, and often also on each side of the midrib on its upper surface. The length of a full-grown frond is from six inches to a foot and a half. It grows very luxuriantly on stone walls, at the borders of streams, or the sides of wells, and is sometimes found in mines or caverns. Sir J. E. Smith says of its fronds, "In the now open vault by the great hall in Conway Castle, I have gathered them upwards of three feet long, and nearly five inches wide." Sir W. J. Hooker found them in the moat at Kenilworth Castle more than two feet long. A very stout and strong midrib runs through the leafy part, from which forked veins arise, the smaller veins being parallel to each other, and running towards the margin, but ending just within it. Oblong clusters of fructification, some long and some short, lie in the direction of the veins, at short intervals, on the upper part of the leaf, occupying about two-thirds of its length. They are placed in oblique parallel lines on each side of the mid-vein, and when seen in their ripened state seem to be single. If these are examined when young, they may however be seen to be composed of two distinct patches, facing each other, and divided

by a small line, which is finally hidden by their uniting into one mass. Each of the lines consists of a complete cluster, and when joined together this is called a twin-sorus. This twin-sorus is always placed between two bundles of veins, and covered by the thin white membrane-like indusium of the same form as the clusters. In an early stage, the indusia, touching each other, seem like one only; then they separate slightly, the distinction between them becoming daily more apparent till they finally become widely separated and fall off. This plant was considered of some medicinal use by our fore-fathers, and was included in what were termed the five "capillary herbs." The Golden or Common Polybody, the Common Maidenhair, the Common Spleenwort, the Wall-rue, and Hart's-tongue, formed this group, which was in early days held in great esteem.

The Hart's-tongue offers a great number of varieties, especially when cultivated, as it so often is, on rock-work. A very elegant and common variety, termed *crispum*, is so waved and curled at the margin, that it becomes a leafy frill on each side of the midrib; it is often of a much paler green than the common form of the Hart's-tongue. Another well-known variety is that termed *polyschides*, in which the frond is narrow, linear, deeply and irregularly cut at the margin into roundish lobes. A third variety, *lobátum*, has its fronds strap-shaped below, widening at the upper part, and there cut into two or more acute lobes; and a very beautiful variety, *multifidum*, has its fronds strap-shaped below, spread out at the upper part, and cut into crowded, more or less blunt, and wavy lobes. A fourth

variety is very remarkable, and has been found on a wall near Taunton; it is termed *lacerátum*, and has its broad fronds deeply lobed or pinnatifid.

Some forms of this fern are found, when under culture, to be viviparous; that is, buds arise upon the stem, which separate spontaneously from the plant itself and become young ferns. A variety of *Polýstichum anguláre* has been for some time known as viviparous, but from recent observations it would seem that the same peculiarity is observable in several of the British ferns, though it remains yet unproved whether this phenomenon will be found to be permanent. A writer in the "Gardener's Chronicle" for November, 1854, says, "I possess two forms of *Scolopéndrium vulgare*, *Polýstichum lobatum*, *Lastrea fœniscii*, and *Lastrea Filix-mas*, all of which have either produced a viviparous plant, or are gradually developing bulbillæ." He adds, that he could name other persons who have observed similar instances of reproduction in ferns.

The Hart's-tongue is called by various writers, *Phyllites Scolopéndrium*, *Asplénium*, *Scolopéndrium*, or *Scolopéndrium Phyllitídes*.

11. Céterach (Scaly Spleenwort).

1. *C. officinárum* (Common Ceterach, or Scaly Spleenwort).—*Fronds* linear-lanceolate, pinnatifid, covered beneath with chaffy scales; *segments* blunt. This fern is readily distinguished from any other British plant. It varies very little in form, and the whole of its under surface is thickly clothed with brown scales. The fronds are from two or three to six inches long, very



W. Hicks del et

SCALY SPLEENWORT
Ceterach officinarum

thick, tough, and leathery, the upper surface of a dark green hue, slightly downy, and having a brown edge, in consequence of the projection beyond the margin of the scales which are beneath. The outline is long, narrow, very deeply divided into rounded lobes, which are often again notched or cut into segments, and they stand in an oblique position towards the midrib. The whole of the under side is of rich brown colour from the dense mass of scales, and the short stalk is also scaly.

The thick texture of the fern renders the veining indistinct, and it can only be seen in the young fronds which appear in May. A vein enters from the lower corner of the lobe, winding towards the top; the lateral veins branch in an alternate direction; and these are again forked towards their summits, crossing each other somewhere near the margin. The sori lie along the sides of these forked veins in a very regular manner, being at first quite hidden by the scales, but afterwards standing up distinctly from them, though, being brown and chaffy like the scales, the two are easily confounded except by a close observer.

The short tough roots of this fern insinuate themselves effectually into the crevices of walls, and the tufts of Scaly Spleenwort are not uncommon on ruins and ancient castles and churches, as well as on rocky places, especially in limestone districts, in England and Ireland; but the plant is rare in Scotland, though found in the neighbourhoods of Perth, Paisley, and Glasgow, as well as in some other localities of that country. The old Arabian writers said much in praise of its worth in complaints of the liver and spleen, and our herbalists

eulogize its efficacy as an outward application to wounds. It appears to be the true Spleenwort of the ancients, and the plant to which they attributed so great an effect in disorders of the spleen. The Cretan swine, when feeding upon it, were said to lose that organ altogether, and it was believed that, when taken to excess, the same injury was experienced by the human constitution. It has of late years been recommended as a good medicine in cases of jaundice. The fern is evergreen, and it grows to a much larger size in warmer regions than in our country. It seems, however, to be the same plant, owing its luxuriance to the climate. The author has seen a specimen of the Scaly Spleenwort brought from Madeira, in which some fronds of the tuft were fourteen inches long, though our native fronds are usually about three or four inches in length. The synonyms of this fern are *Grámmitis Céterach*, *Scolopéndrium Céterach*, or *Notolepeum Céterach*

12. Blechnum (Hard Fern).

1. *B. boreále* (Northern Hard Fern.)—*Barren fronds* pinnatifid, with broad blunt segments; *fertile fronds* pinnate, with narrow acute segments. Our only native species of this fern grows in handsome clumps, attracting the notice of the lovers of plants by the marked difference between the barren and fertile fronds which spring from the same roots. It is by no means a rare fern; and many a rambler, intent on forming a wild nosegay, gathers its bright green leaves to mingle with his branch of ling, or heath flowers, "or bonnie broom." Cowper had, perhaps, admired this among



HARD FERN
Blechnum boreale.

the ferns which grew on such spots as he describes in his rambles :—

> "The common overgrown with fern, and rough
> With prickly gorse, that shapeless and deformed,
> And dangerous to the touch, has yet its bloom,
> And decks itself with ornaments of gold."

But though this beautiful fern luxuriates especially on moist boggy lands, it is not confined to such localities; it grows also in woods and on banks, particularly such as are rendered moist by streams or pools, and where the soil is of sand or gravel. Though occurring in most counties of the kingdom, yet it is somewhat local in its haunts, and not always to be found where we should soonest have looked for it. It is a fern readily distinguished, the barren fronds spreading more around the spot whence they arise, sometimes being quite prostrate on the ground, and having the pinnæ much closer together than in the taller erect fertile fronds, which are cut into so many slender divisions as to resemble the teeth of a comb; the barren ones having their segments only cut nearly to the midrib, while the fertile ones are distinctly pinnate. The former are about half, or rather more than half the height of the fertile leaves, and have short scaly stalks. The fertile fronds, which are about a foot or a foot and a half high, have a dark brown stalk nearly half their length, with long pointed scales upon its surface, and are at once distinguished by their upright growth.

Both kinds of fronds are bright green, and their veining is similar, except that in the fertile frond a long vein runs down each side of the midrib, and on this are

placed the lines of fructification. Forked veins run almost to the margin on each side of the mid-vein, which are club-shaped at the extremity. When young the clusters of capsules are distinct, but they afterwards crowd into one linear mass. At an early stage they are covered by an indusium, which soon bursts open at the side nearest the mid-vein. Though growing on open heaths, the plant always seems finest when found under the shadow of bushes. This fern has been called *Bléchnum spícant*, *Lomária spícant*, *Osmúnda spícant*, *Asplénium spícant*, *Acróstichum spícant*, and *Osmúnda boreális*.

The clumps of *Blechnum* are so handsome, among the wild flowers and grasses of summer, that we should be sorry to miss them, though they cannot be turned to any economical uses, nor will cattle eat of their crisp leaves. The plant was by old writers called Rough Spleenwort. Gerarde says, "There be empiricks or blind practitioners of this age, who teach that with this hearbe not only the hardnesse and swelling of the spleene, but all infirmities of the liver also, may be effectually and in a very short time removed, insomuch that the sodden liver of a beast is restored to his former constitution againe, that is, made like unto a raw liver, if it bee boyled againe with this hearbe. But this is to be reckoned among the old wives' fables, and that also which Dioscorides telleth of, touching the gathering of Spleenwort by night, and other most vaine things which are found scattered here and there in old books, from which most of the later writers do not abstaine, who many times fill up their pages with lies and frivolous



COMMON BRAKE.
Pteris aquilina

stories, and by so doing do not a little deceive young students." The Spleenwort of Dioscorides was, however, apparently the Ceterach.

A species of Hard Fern (*B. cartilagineum*), which grows abundantly in New South Wales, is much eaten by the natives. Its thick tough underground stem is, after roasting, placed on a layer of wood, and beaten so as to break the woody fibre. In this state the natives eat it without removing the charred substance. It is described as resembling in flavour a waxy potato, but as more gelatinous in substance.

13. Ptéris (Brake).

1. *P. aquilína* (Common Brake).—*Fronds* three-parted; *branches* twice pinnate; *pinnules* linear-lanceolate, the lower ones often pinnatifid or cut. The Brake or Bracken is the most common of all our ferns; and one well known to every one accustomed to the country. Though less elegant and graceful than some of our smaller species, yet it well deserves the epithet of feathery, when it attains a large size, and bows gracefully before the autumnal gale. Like many other ferns, it is not luxuriant on chalky soils, but is abundant on those which are stony or sandy; sometimes half filling the copse by its plentiful growth, often forming picturesque clumps on the heath land, where

"Heath-bell dark and bracken green"

are among the most frequent plants. On the winter hedge large masses of the dead fronds may often be seen hanging about the boughs, and of one uniform

pale brown colour, contrasting with the green leaves of Polypody on the trunk of the tree, or with clumps of Hart's-tongue, among whose bright green fronds we may see the occasional tint of brown which tells of the touch of winter. The tall branches of the Brake, too, bordering the park, form an excellent covert for game, and the deer are fond of lying among them :—

"The wild buck bells from ferny brake."

The fronds, though often not more than a foot high, attain great luxuriance in some places, and become taller than any other of our native ferns They are sometimes ten or twelve feet in height, and their texture is crisp and brittle. In the north of England, and in various parts of Scotland, this fern is used for many domestic and economical purposes. In Scotland, country women may often be seen coming away from the heath laden with its young branches, which serve as food for swine; and the peasant cuts it down in large quantities, and placing it in heaps to dry in the sun, and to be wetted by the rains, uses it when thus prepared for manure on his land; or he cuts up some of the fresh fronds and mingles them with hay as food for his horses. A writer in the "Magazine of Natural History" says, that in many of the open mountainous parts of Wales, where it grows abundantly, the Brake is cut down in summer, and "after being well dried, is burned by the cottagers in large heaps for the sake of the alkali contained in the ashes. When sufficiently burned, enough water is sprinkled on them to make them adhere together; they are then rolled into round balls, about two inches or

two inches and a half in diameter. These balls are thoroughly dried, and carried about the neighbourhood for sale in the markets, and they are also frequently kept by shopkeepers to supply their customers." They serve the purpose of economising the use of soap. They are, before being used, thrown into the fire, and when thoroughly heated are placed in water, which thus becomes a strong ley. The ancients are supposed to have used both the fronds and stems of the Brake in diet drinks, and medicines for many disorders have, at various times, been made in our country from this fern. It is very astringent, and has been recommended for dressing and preparing kid and chamois leather; while both in this and other lands the ashes, from the alkali which they contain, were found serviceable in the manufacture of soap and glass, until discoveries in chemistry suggested the use of other materials for the purpose. This very astringency seems to render the Brake unsuitable for the food of man, though some writers think that nutriment would be afforded by its large rhizome. This is often ground to powder, and mixed with the flour in bread eaten in some parts of Normandy; but, perhaps, like the admixture of pine bark with the flour, used in some countries in the north of Europe, it adds rather to the quantity than to the nutritious quality of the bread. The rootstock of this brake, however, as we are informed by Humboldt, serves the inhabitants of Palma and Gomera, in the Canary Islands, for food. They grind it, he says, to powder, and mix it with a small quantity of barley meal. This composition is termed *gofio;* and the author adds,

that the use of so homely a diet is a proof of the extreme poverty of the people of these islands. This naturalist saw both the Brake and our common Northern Hard Fern growing in the Canaries in great luxuriance, though never attaining either the size or stateliness of the arborescent ferns of Equinoctial America. Tree ferns frequently afford food to the natives of the lands in which they are found. Dr. Joseph Hooker, in his recent "Himalayan Journal," says that ferns are more commonly used for food than is supposed. He tells us that both in Sikkim and Nepal the watery tubers of an *Aspidium* are eaten. So, also, the pulp of one tree fern affords food, but only in times of scarcity, as does that of another species in New Zealand, *Cyathea medullaria*. Their pith is composed of a coarse sago, that is to say, of cellular tissue with starch granules. The Esculent Brake (*Ptéris esculénta*), a fern very similar to our Bracken, is a very troublesome plant to the agriculturist, in his attempt to clear the land in New Zealand; and Polack calls it "the interminable fern-root." The rootstock is much used by the natives as food, as it is also in the Society Isles and in Australia, where it is the most extensively diffused edible root. In the latter country this plant is called *Tara* by the aborigines, a name which in the southern hemisphere is given to several roots which are eaten, and also to rice. Mr. Backhouse shared, with some of the natives of Australia, the meal made of the inner portion of the upper parts of a tree fern. He says that it was too astringent to be agreeable to his palate, and little improved by cooking, but that it was something like a Swedish turnip in substance.

Our common Brake is one of the most frequent ferns in many parts of the United States of America. Sir Charles Lyell saw it in abundance on the mountains of New Hampshire, where the Maples with their crimson foliage, and the boughs of the Spruce fir, and the rich flowers of the Kalmia waved in their glory above the moist ground which was covered with the green Bracken; and it is in that land, as in ours, used for packing fruit. The author of these pages has often seen this fern employed for making a bright fire on the hearth, or has helped, during childhood, to gather it from the hedges of the cherry orchards of Kent, that the cherry-pickers might bind it over their baskets of fruit, its large fronds keeping the glossy cherries cool and fresh for the London markets. As a packing material for apples it is excellent, for it preserves their freshness better than any other substance, without imparting either the slightest colour or flavour. Both this plant and the Male fern have been used in brewing. Professor Burnett observes that from the analysis of the latter, made by Morin, it is probable that they would form one of the best substitutes for hops, as they contain both gallic acid and tannin, which are absent from most of the bitter plants that have been applied to this purpose, and which have failed from being unable to precipitate the glutinous mucilage which renders beer made without hops so liable to turn sour.

This plant was in all probability the especial *fearn* of our Saxon ancestors; for although in the sixteenth century several of the commoner ferns were well known and described, yet this is by far the most frequent and

most conspicuous plant of the tribe in all parts of this kingdom. To its abundance in several places, doubtless, we owe the old names of various towns and villages; as Fearnham or Farnham; Farnhurst; Farnborough; Farnworth, and Farningham. To this fern, too, probably the old proverbs and poems refer. Several of the latter were collected from the secluded villages of our country by John Ray, but the rustic wisdom which they may be supposed to contain is not always apparent to modern readers. There was a homely proverb once in common use:—

> "When the fern is as high as a spoon,
> You may sleep an hour at noon;
> When the fern is as high as a ladle,
> You may sleep as long as you're able;
> When the fern begins to look red,
> Then milk is good with brown bread."

The name of Brake, as well as the Scottish one of Bracken, is a very old one for this fern. In the old Anglo-Latin dictionary published by the Camden Society, we find "Brakane or Brakanbuske," described as "ferne or brakans." The Editor, Mr. Albert Way, observes that Ray gives the word "brakes" as generally used in his day; and he adds, that it is generally retained in Norfolk and Suffolk. It is probably pretty general in most counties of the kingdom; it is certainly the common name of the plant in Kent, and the fern is also usually called Brake in North America. Mr. Way observes in a note:—"In the Household Book of the Earl of Northumberland, 1511, it appears that water of Braks was stilled yearly for domestic purposes." In other old writers we find it called "forne." Thus, in

the Diary of Henry Machyn, Merchant Taylor of London, written in 1552, we read of a man who was placed in the "pelere" for "selling potts of straberries, the whych the pott was not alff fulle but fylled with forne."

The portion of the stem of the Brake just below the surface of the earth is often dug up by country children, and cut across, in order that they may see a figure represented by the bundles of tubes and fibres which lie among its cellular mass. Dark brown or black markings may be observed among the whitish substance. In some counties, as in parts of Kent, these marks are fancied to represent the letters J C; a fancy which originated, doubtless, in those superstitious times when, little as men knew of the open page of Nature, they knew less still of the written page of God's word, and when they imagined that Nature pointed to truths taught only by revelation. In other places the markings are supposed to show the figure of an oak, and to have first grown there in memory of the tree which gave shelter to King Charles during his flight. An old tradition is yet told that James, the unfortunate Duke of Monmouth, after the battle of Sedgemoor, concealed himself for some time successfully beneath the Bracken boughs. One day, however, emerging in some degree from his retreat, he sate down, and amused himself by cutting some of the stems of the fern under which he had slept on the past night. Some peasants who noticed him were surprised to see a man clad in homely garb like their own, with delicate white fingers, on one of which glittered the diamond of a ring; and when, soon after, the reward was offered for the apprehension

of Monmouth, they recalled the circumstance and sought for him where he lay concealed beneath the withered heap of fern. No wonder that imagination could readily trace in the heart of the fern some semblance which could identify the plant with the remembrance of the two fugitive princes, the father and son, whose fates were so different. The oak-tree is still believed to be portrayed there; and the author, during childhood, shared in a belief very general in the neighbourhood of her home. In Germany, this figure is commonly called the Prussian Double Eagle; and older, probably, than any other tradition is the received opinion, that the marks in the fern stem represent an eagle, and gave to the plant one of its common names, the Eagle fern. This idea is casually alluded to in one of the Colloquies of Erasmus, when one of the speakers observes of the Toad-stone, or *Crepaudine*:—"Perhaps they imagine the likeness of a toad; as on cutting the root of fern we imagine an eagle."

In the thick shady woods in which our Brake luxuriates, its root-stems creep many feet below the surface of the soil. They are as thick as the finger, and covered with a beautiful soft velvety down. The young fronds, which appear in May, are curled and drooping, of a delicate whitish green, and very tender, having both that starch-like odour and flavour peculiar to ferns. By September their bright green is touched with golden hue, which finally yields to the brown tint colouring the crisp fronds as they rustle in the winter winds.

The outline of the frond of this fern is somewhat triangular, and it is either twice or thrice pinnate. The

greater number of fronds are thrice pinnate, having several pair of pinnæ, with twice pinnate branches. In some cases all the pinnules are entire ; in others they are pinnatifid. The stalk is usually rather more than half the length of the frond ; it is green, and while young, somewhat downy, but as the fern grows older it becomes very hard and rigid, and has so many angles upon it, that many a wanderer in the woods has suffered from grasping it too hastily. In places where the fronds do not attain any luxuriance, they are more decidedly triangular ; they have then the appearance of being three-branched, because the other pairs of pinnæ, so usual on the finer specimens, are not in this case developed.

The fronds of the Brake are almost all fertile ; yet, let us gather the plant at what season we may, no fructification is to be seen on its under surface until we search for it ; not that the capsules are not abundant, for, during Autumn, they cluster in profusion on almost every plant, but they are hidden under the margin. In this plant the margin of the fern forms the indusium. It is thickened into a rim, beneath which lies a row of capsules, which run all round the edge of the fern. If our fathers had known this fern only, we should not have wondered at the idea which some, at least, seem to have had, that ferns bore no seed. Pliny says, "Of fern be two kinds, and they bear neither flower nor seed." The general opinion some centuries later, however, was, that the fern-seed was visible only on St. John's Eve, just at the precise moment at which the Saint was born :—

"But on St. John's mysterious night,
Sacred to many a wizard spell,
The hour when first to human sight
Confest, the mystic fern-seed fell."

The superstitious belief that he who could at that hour get some of the fern-seed became invisible, is frequently alluded to by our old poets. Shakspeare makes one of his personages say—

"We have the receipt of fern-seed; we walk invisible?"

Fletcher says—

"—— Had you Gyges' ring,
Or the herb that gives you invisibility?"

And one in Ben Jonson thus refers to it:—

"I had no medicine, Sir, to walk invisible;
No fern-seed in my pocket."

Yet the seeds of ferns are very numerous, and myriads are borne on the slightest summer breeze, like a thin vapour, and sent forth to fertilize our beautiful earth. Professor Lindley observes of the Hart's-tongue, which is but a small fern, that a little computation will show its means of dissemination to be prodigious. Each of its clusters, he tells us, consists of 3,000 to 6,000 capsules. Taking 4,500 as the average number, then each leaf has about 80 clusters, which makes 360,000 capsules per leaf; the capsules themselves contain about 50 spores or seeds, so that a single leaf of Hart's-tongue may give birth to no fewer than 18,000,000 of young plants.

Thus numerous and beautiful, too, in themselves, are the seeds of ferns, enclosed within the elastic rings

of their tiny cases, which are seen by the aid of a microscope to be covered over with markings so varied and so delicate, that the line of the finest pencil can scarcely represent them. The finger of God has traced them there, and left them to tell to us of His power and skill.

Each pinnule of the Brake has a mid-vein, whence issue side-veins, which are either opposite or alternate. These are twice forked before reaching the margin, where they unite with a vein which runs round the edge, and forms the receptacle for the clusters of capsules. The indusium consists of a white membranous fringed expansion of the thin skin of the upper surface, which rolls under so as to cover the fructification seated on the marginal vein. Beneath this line of capsules is another bleached and fringed membrane, very similar to the first, which is also apparently an expansion of the skin of the under surface.

The following lines were written for this volume by Mary Isabella Tomkins:—

THE BRACKEN.

As a coming screen grows the Bracken green,
Up springeth it fair and free,
Where in many a fold, grotesque and old,
Twineth the hawthorn tree;
A covert meet from the noontide heat,
For should you steal anear,
You may chance discern, 'neath the spreading fern,
The antlers of the deer.

It boasteth a name of mystic fame,
For who findeth its magic seed

A witching and weirdly gift may elaim
To help him at his need:
Unseen, unknown, he may pass alone
Who owneth the fern-seed spell;
Like the viewless blast, he sweepeth past,
And walks invisible!

Have ye to learn, how the Eagle fern
Doth in its heart enshrine
An oak-tree like that which the hunter Hearne
Haunted in days "lang syne?"
An oak-tree small is repeated all
Complete in branch and root,
Like the tree whereunto King Charles did flee,
When press'd by hot pursuit.

To his son its shade gave but traitor aid
When, striving to lie eonceal'd,
On foot he fled, in fear and dread,
From Sedgemoor's fatal field;
In doublet mean was a peasant seen,
Wearing a priceless ring—
He whom the voice of the people's choice
So late had hail'd their king.

Oh, Eagle fern! when I thee discern,
When thy wither'd leaf I meet,
In plaees the careless foot might spurn,
The erowded mart or street,
Thou takest me back to thy birth-place fair,
Where thou wavest in thy pride,
And the form of the hare and the deer's elose lair
Doth 'mid thy stems abide.

14. Adiántum (Maiden-hair).

1. *A. Capillus-Véneris* (True Maiden-hair).—*Frond* irregular; *pinnules* stalked, lobed, roundish, wedge-shaped, alternate; *barren lobes* serrated; *fertile lobes*



MAIDENHAIR
Adiantum capillus veneris

terminated by a linear oblong cluster of fructification. Our only British species of this genus is easily known from all other native ferns by its fan-shaped leaflets, but the characteristics of the genus are to be found in the veining and the marginal fructification. The plant is called True Maiden-hair, to distinguish it from some other ferns which share with it its familiar name. It is one of the loveliest of our native plants, and in its wild state is among the most rare; but it is familiarly known to fern-lovers, because it is one of the most frequent ferns grown in closed glass cases, where it attains great perfection, and where it is often the companion of another species brought from Madeira, which, though having larger fronds, is not more elegant. The main stalk of our Maiden-hair is seldom thicker than a packthread, and the little stalks which support the thin fan-shaped pinnules are so slight and elastic, so black and hair-like, as to have gained for the fern its specific name. Its slender creeping rhizome is shaggy, with black hair-like scales, and the base of the stipes is of a rich red-brown colour. The fronds, which grow in lax tufts, make their appearance about May, and are matured by June; they are usually about six or seven, but sometimes twelve inches in height. They are either twice or thrice pinnate. The pinnæ, or branches, diverge alternately from the stalks; the little leaf-like pinnules are also alternate, and each is placed on a separate stalk. The form of the leaflets, though varying much in different situations, is yet more or less fan-shaped, the terminal one being often wedge-shaped. The margin is lobed, the barren lobes are serrated, but the edges of

the fertile lobes are turned under, and thus form a membrane-like indusium to the clusters of fructification. The stalk is usually about half the length of the frond, and is glossy black, or deep purple. The veins in all the pinnules are two-branched or forked from the base, the branches extending in straight lines to the margins, where in the barren fronds they end in the marginal notches. In the fertile fronds, however, they extend into the indusium, and become the receptacle for the clusters.

The bright cheerful evergreen tint, the elegant form and lightly waving attitudes of this fern, render it very attractive; and when growing against the sides of the sea-rock or other moist place in any abundance, no fern exceeds it in beauty. Sir William Hooker remarks, that this most delicate plant is very abundant in the south of Europe, where he has seen it lining the inside of wells, as it does the basin of the fountain at Vaucluse, with a tapestry of the tenderest green. It grows sometimes even on rocks washed occasionally by the spray. It is not a Scottish fern, but occurs on the south and west coasts of Ireland in great luxuriance. It is also plentiful in some spots in Wales, but the only English counties in which it is to be found are those of Cornwall and Devonshire. Mr. N. B. Ward sent specimens of the Maiden-hair to Mr. Newman from the neighbourhood of Ilfracombe, where he found it growing in great beauty on the face of the crevices of a rock in White Pebble Bay, in a dense mass, which commenced at the height of about twenty-five feet, and descended to within about five feet of the level of the sea. It prefers a per-

pendicular surface. It is a native of almost all tropical lands. Few ferns would be more graceful adornments to the sides of streams and pools, were it not so easily injured by the frost in exposed situations; though in the Wardian case its greenness is to be seen as well in the depth of winter as in the summer. The surface of the frond is always so smooth that water runs from it. Pliny had observed this, for he says, "In vain you plunge the Adiantum in water; it always remains dry."

The fronds of this fern have, from earliest times, been used it this country as a remedy in pulmonary complaints. They yield, when boiling water is poured on them, some degree of mucilage, and emit at the same time a slight odour. That ancient writing known as the Arundel MS. says of this plant—"It mundifyeth the lunges, and the breste, and caccheth out wykede materes in hem." While from the same authority we learn that "Margery perles wastyn and fordon and cacchen out of the body wykede humours." The Maiden-hair seems to have been universally regarded as a cure for cough and difficulty of breathing; and Kalm relates that the American Indians have used it from time immemorial for this purpose. John Ray cites it as a cure for innumerable maladies; and later herbalists praised the decoction of the Maiden-hair, not as a remedy only for cough and other pectoral complaints, but as also a cure for jaundice, swollen joints, and many other diseases; and affirmed, that it "stayeth the falling or shedding of the hair, and causeth it to grow thick, fair, and well-coloured;" though, in the preparation of the plant for this purpose, the herb termed Smallage, which is our

Wild Celery, was added, and both were boiled in oil and wine.

The Canadian species of Maiden-hair (*Adiántum pedátum*) was introduced into this kingdom by John Tradescant. It grows in Canada in such profusion, that when the French were in possession of that country they were accustomed to send over large quantities of the plant to France merely as a package for goods, and hence the druggists of Paris used this fern extensively instead of the true Maiden-hair. Both plants possess some astringency, and in France are still taken for coughs; but the chief use of Maiden-hair in our times is in the preparation of Capillaire, which is made by boiling the fern into a syrup with sugar, and flavouring it with orange-flowers. The French term our native species *Capillaire de Montpellier;* but they also call it *Adianthe;* while the Dutch and Germans term it *Venus-haar*, and the Spaniards and Italians, *Adianto*. It is a safer plant to use in decoction than the Canadian species, as that has some emetic properties, if taken in any quantity. Our beautiful plant grows in great abundance in the South Isles of Arran, off the coast of Galway, covering the rocks with its light green fronds; and the people of these isles use it as a substitute for tea. In India, a pretty species, *A. melanococcum*, is much prized as a tonic medicine.

15. Trichómanes (Bristle Fern).

1. *T. radícans* (Rooting Bristle Fern).—*Fronds* three or four times pinnatifid, segments alternate, linear, entire or two-cleft, obtuse; *involucres* solitary in the axils



EUROPEAN BRISTLE FERN.
Trichomanes rad.

of the upper segments. This is an exceedingly beautiful fern, both in its form and in the delicate transparency of its texture. It is unknown in any European countries except Ireland, though it formerly grew at Belbank in Yorkshire; but in warmer climates, the species, or one closely allied to it, is of frequent occurrence. Specimens from Madeira are to be found in the herbariums of most persons who have visited that island, more luxuriant perhaps but not more beautiful than those found at Killarney. Humboldt remarks, that every traveller mentions the elegant Trichomanes which covers the walls and roofs of the antique houses and chapels at Teneriffe, which, he says, in their deserted condition offer great treasures to the botanist. He adds, that the ferns are nourished by the fogs which abound in the neighbourhood. Mr. Backhouse saw a beautiful Trichomanes covering the dark sides of rocks in Norfolk Island. Our Bristle Fern delights in shade and moisture. It is found in several stations in Ireland; the Turk waterfall near Killarney being one often visited by botanists, who have recorded the enthusiastic delight with which they have looked on the hundreds of delicate fronds which form green masses there. It was formerly seen by Mr. Newman very near the waterfall, but the guide of the place has sold so many pieces of this rare treasure to visitors, that the plant is almost exterminated at that spot. It occurs, however, in several other localities, forming by its masses a rich verdant drapery to the wet rock, for it is only in places constantly moist that it can be found, the slightest exposure to drought withering its frail frond. It was in a mossy nook near

Killarney, made greener by trickling waters, that a friend, who termed the nook the "Birth-place of the ferns," and saw its matted fronds drooping among rocks, wrote for our volume the following lines:—

Beside a waterfall, where silvery mist,
Even in summer, makes the noontide dim,
Where clear brown shallow waters curl and twist
Round moss-grown rocks tree-clasped by rootlets slim,
Seated on stones that cumber sore the stream,
Listening the tiny torrent's whirl and dash,
I love to dream a wildering noon-tide dream,
Bright, swift, and changeful as the waters' flash.

Mark ye the ferns that clothe these dripping rocks,
The crosier-headed ferns, most fresh and rare;
Their hair-like stalks, though trembling 'neath the shocks
Of falling spray-drops, rooted firmly there.
What quaint varieties! the leaflets glow
With a metallic lustre all their own,
And velvet mosses, fostered by the flow,
Gain a luxuriance elsewhere all unknown.

Through the light quivering beech-trees, sunshine falls
Filtering athwart the beauty of the glen;
And to his mate the twittering wood-bird calls
With a sweet startled note—then hush'd again:—
We from our perilous stand launch boldly forth
Ventures of rose-leaves on the streamlet's breast,
We block each tiny rapid's foaming wrath,
Making new waterfalls at our behest.

It was owing to the occasional dryness of the atmosphere, that, until the introduction of Mr. Ward's closed cases, this fern withstood all attempts of the cultivator to rear it. If we take up any work on ferns, written a few years since, we find the author commenting on the absolute impossibility of domesticating the Bristle Fern,

as an ornamental plant; though in the glass cases it is now often to be seen, producing larger fronds than in its native locality, and by its green beauty delighting the eye of the dweller in the smoky town, or cheering the heart saddened by long sickness and absence from the scenes of Nature. In Mr. Ward's interesting work on the growth of plants in closed cases—a little book honourable alike to the thoughtful intellect and kind heart of its writer—this gentleman says, that when making the experiments which led to his plan of glass cases, he was induced to commence with this, the most lovely of our cellular plants, in consequence of its being the most intractable under ordinary culture; of its being in fact, as he says, the "opprobrium hortulanorum." "Loddiges," says Mr. Ward, "who had it repeatedly, never could keep it alive; and Baron Fischer, the superintendent of the botanic establishment of the Emperor of Russia, when he saw the plant growing in one of my cases, took off his hat, made a low bow to it, and said, 'You have been my master all the days of my life!'" On some rock-work in Mr. Ward's fern-house, this plant produced fronds fifteen inches in height, by seven or eight in breadth, one-fourth larger than uncultivated specimens, either from Killarney or elsewhere.

The small portion of Trichomanes represented in the plate, is part of a very interesting specimen given to Mr. Dickes by Mr. N. B. Ward. The latter gentleman, in a letter to the Author, says of it, "Some years since, when I had the pleasure of visiting Killarney with Dr. Harvey, we determined to find out, if possible, another locality for *Trichómanes radícans;* and to this end directed

the driver to convey us to some portion of the shores of the lake into which one of the mountain streamlets was continually discharging; well knowing, that in the course of such a rill from the mountain-top, there would occur many places suited to the growth of this moisture-loving plant. We were landed accordingly on the south side of the lake, amid a mass of Osmunda, and after making our way up the stream a few hundred yards, surrounded by masses of rocks confusedly hurled, and coated with fine Hymenophyllum, and various mosses and liverwort, Dr. Harvey, who was in advance, called out, 'Eureka—Eureka!' I hastened onwards, and saw a sight which might have repaid a much more lengthened and laborious search. In the inside of a natural cave, about five feet square, formed by four large masses of limestone, the Trichomanes was growing in its native beauty. One specimen, with a creeping rhizome three or four feet in length, and containing forty-eight perfect fronds, we divided, and my portion is now in the hands of your artist. The mouth of the cave faced the north, so that not a ray of solar light ever reached the plant within; and to this cause I attribute the total absence of fructification on any one of the specimens."

The Bristle Fern has a slender creeping horizontal stem, which winds and branches so as to form a net work over the rock, and is covered with black down. This woolly substance has been found by Mr. Andrews, when viewed under a lens of high power, to consist of articulated bristles, analogous to the scales on the stems of other ferns. The whole frond is so pellucid, the veins so prominent, and the green part so like a

membranous wing around the veins, that it has more the appearance of a sea-weed than a fern. The frond is between lanceolate and triangular in form, the divisions being so much waved as to give it a crisped appearance. It is three or four times pinnatifid, and the slender segments of which it is composed are either entire or two-cleft at the apex, and a strongly-marked and stout vein runs up the centre. Indeed the veins are so prominent and rigid, that they seem the most conspicuous part of the fern, and the frond might very well be said to consist of a number of firm veins, three or four times branched, and edged by a thin green membrane-like wing. Some of the terminations of the veins are surrounded by the green part, which forms a little cup in which lie the capsules of fructification. The involucre, as this is usually called, most commonly projects beyond the margin of the frond, but it sometimes lies within it, and the bristle is often four or five times the length of the cup, though in many cases scarcely exceeding it in length. The fronds are from three inches to a foot long, and mostly droop over the sides of the rocks. Though appearing in May, they are not matured till about November, nor do they attain their whole size or bear their fructification until the third year of their growth. Now that it is discovered to thrive so well in the closed cases, this plant is a favourite subject of the cultivator's care. It requires a pure and constantly humid atmosphere, shade and warmth, and these conditions can all be given by the glass case. It may be grown also in an earthen pot standing in water and covered with a bell-glass. A variety of this fern, of

broader lanceolate, somewhat egg-shaped form, has been termed *Andrewsii*, after its discoverer. The Bristle Fern is by various writers called *Trichómanes brevisétum*, *speciósum*, or *alátum*; and also *Hymenophýllum alátum*.

16. Hymenophýllum (Filmy Fern).

1. *H. Tunbridgénse* (Tunbridge Filmy Fern).—*Fronds* pinnate; *pinnæ* pinnatifid, forming a wing on each side of the rachis; the *segments* serrated and spinous. This delicate, flaccid, membrane-like fern, grows in matted tufts, looking rather like a withered than a living plant, on account of its olive-brown tint, though when really dried in the herbarium it retains much elasticity. The slender, delicate Filmy Ferns are the smallest of our native species, and are somewhat like delicate mosses. The veins are so strongly marked, that, as in Trichomanes, they seem to form the fronds; the filmy cellular portion surrounding them like a wing. Their length is from one to three inches, they grow almost erect, and their outline is lanceolate, or somewhat egg-shaped. They are flat, and their pinnæ once or twice pinnatifid, their branches mostly on the upper side, though sometimes alternately on each side of the pinna. The clusters of capsules are formed round the axis of a vein, which runs beyond the margin of the frond; this vein, or receptacle, being enclosed in a kind of cup forming the involucre. This consists of two compressed valves, which are nearly round, and are swollen slightly at the base, and have a notched and spinous upper margin; and it is by this two-valved involucre that this genus is distinguished from the nearly allied Bristle-Ferns.





2

1





2

1 TENTHOPHYLLUM TUBRIDGENSE

Hymenophyllum Tunbridgense

2 WILSONS FILMY

H. unilaterale

This fern is not peculiar to Tunbridge Wells, though found on several moist rocks in that neighbourhood; and having been first discovered there, the plant is known by the trivial name *Tunbridgense*, not alone in this kingdom, but on several parts of the Continent. It is not a rare fern, as it grows amongst moss in damp and shady places, especially in mountainous or rocky districts in several parts of this country, as in Tilgate forest, Sussex; on Dartmoor, in Devonshire; in many parts of Cornwall; in several localities of Cumberland, Westmoreland, and Lancashire. It is also of frequent occurrence in Wales and Ireland, and in the latter country is sometimes very luxuriant.

2. *H. unilaterale* (Wilson's Filmy Fern or Scottish Filmy Fern).—*Fronds* pinnate; *pinnæ* curving backwards; *segments* linear, entire or two-cleft. This is a small film-like fern, growing on wet rocks in various parts of England and Wales, and very abundant in the Highlands of Scotland, as well as in many parts of Ireland. Though it grows, like the Tunbridge Fern, in matted fronds, and the two plants are often found on the same rock, yet it is a very distinct species. The fronds are much more rigid, of a brownish green tint, somewhat drooping in attitude, and the pinnæ turning back in a direction contrary to that of the fructification. They are about two or three inches long; their outline is linear-lanceolate and pinnate. The rachis is somewhat arched, and the pinnæ are convex above, all turning one way, so that the fronds are more or less one-sided. The wedge-shaped pinnæ are cut into slender, blunt, pinnatifid segments, having a serrated and slightly spinous

edge. The rigid veins are twice branched, and have a narrow leafy wing; but the main stalk of the fern is not winged, or scarcely so. The free ends of the veins are surrounded by the clusters of capsules, which are placed within a cup-shaped, brown, rigid involucre, the valves of which are convex throughout, touching only by their edges, which are quite entire.

Sub-Order II.—Osmundaceæ.

17. Osmúnda.

1. *O. regális* (Osmund Royal or Flowering Fern).—*Fronds* twice pinnate; *pinnules* oblong, nearly entire, the lower base somewhat ear-shaped; *clusters* in terminal panicles. This stately fern, which is also sometimes called King Fern, and Regal Fern, is so different in its appearance from our other British species, that the botanist only would know it to be a fern unless the veining of its leafy frond were examined. It is the most conspicuous of all our wild species, and well deserves its regal name, which, however, it appears to have owed to other circumstances than its stately form. Its name *Osmunda* is of Saxon origin, and perhaps was given in honour of some one who in old times bore the name of Osmund. Osmunda was one of the titles of Thor, the Celtic Thunderer. Some believe the word itself to have signified domestic peace, from *os*, house, and *mund*, peace; however, the word *mund* was evidently sometimes an adjunct signifying strength and power, and formed part of many a name in the olden time, as in Sigismund and Edmund. It is in all probability the



FLOWERING FERN
Osmunda regalis
a Natur. Large

origin of the old word used by the herbalists, who relate of several plants that they mundyfye the system, apparently meaning that they give strength. Gerarde, when describing the stem of this fern, which on being cut through shows a whitish centre, calls this portion of the plant the "Heart of Osmund the Waterman;" a waterman of this name having, according to tradition, dwelt at Loch Tyne, and on one occasion, when bravely defending some of his family from the cruel Danes, sheltered them among the tall branches of this magnificent plant, which is more like a shrubby or tree fern than any other of our native species.

The Flowering Fern is distributed more or less throughout the kingdom, occurring on bog lands, on the wet margins of woods, or on the hedge-bank watered by a stream. It is rarely to be found in the eastern part of England and Scotland, though occasionally gratifying the lover of ferns by its unexpected appearance there. So abundant, however, is it, and so luxuriant in its growth, in many places in Devonshire and Cornwall, as well as about Connaught, in Ireland, that its masses form a marked feature of the scenery. It grows well, too, on the bogs of Lancashire; and sometimes its towering fronds enliven even the dreary sea-coast, where they thrive well on spots only just beyond the reach of the wave at high tide. It generally rises to the height of four or five feet, but tufts of its fronds, growing on the bank of the Clyde, have been measured by botanists, and were found to be eleven feet high. Generally its tall stalk rises erect, and its panicles overtop the flowers which grow beside them; but sometimes this

handsome plant acquires a drooping habit. Mr. Newman, referring to it, says: "I noticed a beautiful instance at Killarney, where it completely fringes the river between the lakes, and certainly forms a most prominent feature in that lovely but neglected portion of that far-famed scenery. So altered is the usual character of this fern, that its long fronds arch gracefully over, and dip their masses of seed in the crystal water; while the saucy coots, from beneath the canopy it affords them, gaze fearlessly on the visitors who are continually passing by." This fern is not difficult of culture, and growing in a large pot of earth kept in water, and placed in the shade, it makes a lovely ornament among the myrtles, and hydrangeas, and rhododendrons, which so often grace the hall of a house. It also thrives well on the margin of pieces of water, or on rock-work near them. It is common to most European countries. The Germans call it *Traubenfarrn;* the Dutch, *Trosvaren;* the Italians and Spaniards, *Osmunda;* and the French, *Osmonde.* In Madeira, it was formerly a most luxuriant and plentiful fern.

The young fronds of the Osmunda are usually about ten or twelve in number, but they are sometimes fewer. Their large leaf-sprays are thin and crisp, and of a bright sea-green colour, usually assuming a deeper green as the plant grows older. The stalk, which is at first reddish brown, afterwards become green, and contrasts well with the rich rust-brown spikes of fructification. These shrub-like fronds are, however, annual, and some of them are barren. They are lanceolate and twice pinnate, the pinnæ being either lanceolate, or lanceolate and egg-

shaped, and the pinnules are oblong and nearly egg-shaped. They are also somewhat ear-shaped at the base. They are rounded at the upper part, and the margins are serrated. The pinnæ at the upper portion of the fertile frond are so densely covered with the brown clusters of capsules, as to look something like spikes of flowers; and they so contract the green leafy portion, that they leave only a green edge, and the mid-vein clear. Lower down on the frond we often see a pinnule or two thus contracted, and partly or wholly covered with the fructification; and we may, during the earlier growth of the plant, trace the gradual contraction of the leafy part of the frond through all the stages, till it is converted into this panicle. This is often, when matured, two or three feet in length, and branched so as to be a yard wide.

The barren fronds are leafy throughout, but differ in no other respects from the fertile ones. In their most luxuriant state, the fronds of this handsome plant are sometimes nearly two yards across.

In the barren fronds we may easily perceive the mid-vein of each pinnule with twice or thrice forked veins issuing from it to the margin. In the fertile fronds the clusters of capsules are seated on these veins, which are just sufficiently developed to form a receptacle. The capsules are nearly globular, stalked and two-valved.

This plant, which appears in May, is matured by August, but is destroyed by the early winter frosts. It was formerly in much repute for its medicinal properties, but it is now little used, though its stem is astringent and somewhat tonic. An old writer, who calls it also the

Water Fern, says: "This hath all the virtues mentioned in other ferns, and is much more effectual than they, both for inward and outward griefs, and is accounted good in wounds, bruises, or the like. The decoction to be drunk, or boiled into an ointment of oil as a balsam or balm, and so it is singular good against bruises, and bones broken or out of joint." The root, when boiled, is very slimy, and is used in the north of Europe for stiffening linen.

Sub-Order III.—Ophioglossaceæ.

18. Botrýchium (Moonwort).

1. *B. Lunária* (Common Moonwort).—*Frond* pinnate; *pinnæ* crescent-shaped, or fan-shaped. It is on the dry open moor, amongst heather and heath-bells, that we must look for the Moonwort, which, though not a common plant, is more or less distributed throughout the United Kingdom. In England it seems to occur most frequently in the counties of Staffordshire, Surrey, and Yorkshire; generally on old pasture lands or heathy places; but it has occasionally been gathered in a wood. Like the Flowering Fern, its habit differs much from that of ferns in general, and it is well named Moonwort, from the usually crescent-shaped leafy pinnæ. Doubtless this form induced the old alchemists and professors of magic to value it so highly, for moon-shaped plants, or parts of plants, were readily believed to indicate some wondrous potency. And several old poets refer to it:—



1 MOONWORT
Botrychium lunaria

2 COMMON ADDER'S TONGUE
Ophioglossum vulgatum

3 TESSERA 7
O Insitanicum

"And I ha' been plucking plants among
Hemlock, henbane, adder's tongue;
Nightshade, moonwort, Ibbard's-bane,
And twice by the dogs was like to be ta'en."

Many of our oldest writers on plants had most firm assurance of strange powers possessed by this fern: thus Coles remarks—"It is said, yea, and believed by many, that Moonwort will open the locks wherewith dwelling-houses are made fast, if it be put into the keyhole; as, also, that it will loosen the locks, fetters, and shoes from those horses' feet that goe on the places where it groweth; and of this opinion was Master Culpeper, who, though he railed against superstition in others, yet had enough of it himselfe, as may appear by his story of the Earl of Essex his horses, which being drawne up in a body, many of them lost their shoes upon White Down in Devonshire, neer Tiverton, because Moonwort grows upon the heaths." Withers, writing in 1622, says—

"There is an herb, some say, whose vertue's such
It in the pasture, only with a touch,
Unshoes the new-shod steed."

There were herbalists, however, even in those credulous times, who denounced this belief; as did Turner, who published his "British Physician" in 1687, and who says, that the plant is neither smith, farrier, nor picklock; yet even he prizes the fern for its medicinal virtues, and declares himself confident that it is the Moon's herb. Gerarde mentions the use of this fern by the alchemists, who, he says, called it Martagon. It appears to have entered into some of those compositions over which so many men spent their nights and days in

fruitless labour and frequent disappointment. It may be, however, that now and then, as the German chemist Glauber in his ardent pursuit of alchemy discovered the sulphate of soda, since called Glauber's salts, so some unexpected good resulted from their labours. Gerarde, who calls the notions prevalent in his time of the magical powers of the Moonwort "drowsie dreams and illusions," yet held the general opinion of its medical efficacy, and its use as an application to wounds. A large succulent species of Moonwort, which is abundant in many of the southern United States of America, the *B. Virgínicum*, is boiled and eaten in Nepal, and abundantly in New Zealand. Dr. Joseph Hooker, who saw it in the former country, says of this fern, that its distribution is most remarkable, it being found very rarely indeed in Europe, and in Norway only; while it abounds not only in that part of America, but also in the Andes of Mexico, in the Himalaya Mountains, Australia, and New Zealand. In Virginia it is called the Rattlesnake fern, because that venomous reptile shelters itself beneath the covert formed by its fronds, which would therefore serve to him who wanders near as an indication of the danger lurking unseen.

The frond of our common Moonwort rises very early in spring, and would not, in its young condition, suggest the idea that it was a fern. It seems at first but an upright simple stem, about an inch high, but this is in fact a bud, enclosing the frond within it; the lower part or rachis of the frond, thus covered up, is thicker than the upper part, and the two branches of the young frond face each other, the fertile being clasped by the barren

one, while the whole is closely wrapped in scale-like sheaths. The plant, when in June it has become fully devloped, is from three to eight, or more rarely ten inches in height, of a dull yellowish green colour, the lower part or stipes being succulent and hollow, and having at its base the remains of the scale-like sheath which once invested it. About half-way up it divides into two branches. The leafy branch is pinnate, and from three to eight pairs of crescent or fan-shaped leaflets are closely crowded upon it, their outer margin indented with slightly-rounded notches. The veins radiate towards the margin, one vein extending into each notch. The fertile branch of the fern is erect and branched, the branches being generally about the same in number as the pinnules on the leafy branch; these side pinnæ are again divided into lesser branches, on which the fructification grows. This forms a spike distinct from the leafy expansion, and is not, as in *Osmúnda*, a contraction of the green part, nor are the clusters or capsules crowded, like those of that fern, into a mass; but though nearly touching each other, they are separate, and arranged in single rows along the branches of the spike. The capsules are globular in form, without stalks, smooth, composed of two concave valves, and are at first yellow and afterwards brown. The fern varies in different situations, and in one form the pinnæ are pinnatifid; but it is at all times so distinct from any other British fern that it is never difficult of recognition. It is known throughout Europe and Northern Asia. It is sometimes called *Osmúnda Lunária*, or *Lunária mínor*.

19. Ophioglóssum (Adder's-tongue).

1. *O. vulgátum* (Common Adder's-tongue).—*Barren frond* egg-shaped, blunt; *fertile frond* club-shaped. This is a common plant, abundant in many parts of England, and easily known from any other fern. One who was not a botanist would describe its full-grown frond as being a green leaf, sending up from its base a stalk bearing a spike. If we look for this plant in May, we may find the bud underground: this was formed in the previous autumn, and on being opened, it may be seen to enclose not only the leaf and spike for the next year, but also the rudiment of the leaf for the year after. The plant, when seen in the middle of the month of June, at which time it is fully developed, is erect, with a long smooth succulent stem, of a pale green colour, a leaf of a deeper green tint, not with forked veins like most ferns, but with veins forming a net-work, while from the inner part of the leaf rises the stalk, which varies from about an inch to three inches in length. The spike on this stalk tapers towards the summit, and is formed of two lines of crowded capsules imbedded in its substance, and occupying its two opposite sides. The capsules, which are globose, are filled with a fine dust, like the pollen of flowers. When fully ripened they discharge their contents, and if the soil is moist the plant becomes so plentiful in the pastures in the course of a few summers as to injure it greatly. Though local in distribution, yet in parks and clayey pastures we might sometimes gather a basket full of plants in the course of a few hours. It is no marvel that our fore-

fathers called it Adder's-tongue, or Adder's-spear, for, like the reptile after which it was named, it was believed to have great power for evil, and not only to destroy the grass among which it grew, but to injure the cattle which fed upon it. The plant was, however, prized as a remedial agent by the old herbalists. Gerarde said of it, that it would, when boiled in olive oil, afford "a most excellent greene oyle, or rather a balsam for greene wounds, comparable to oyle of St. John's wort, if it doth not far surpasse it; whose beauty is such that very many artists thought the same to be mixed with verdigrease." No doubt many of the vegetable remedies for wounds were rendered serviceable by the oil with which the juices were so frequently mingled. A preparation, called the "green oil of Charity," is in some counties still deemed a panacea; and Adder's-spear ointment, made of our fern, mingled with plantain and other herbs, is in much use in villages, and its green leaves are yet laid on wounds to heal them, serving doubtless to cool the inflammation, and also to unite the edges of a wound inflicted by a sharp instrument. Culpeper praises the juice of the leaves mingled with the distilled water of Horse-tail, as a "singular remedy" for internal wounds. Large quantities of the plant are gathered in some villages of Kent, Sussex, and Surrey, and prepared according to the old prescriptions. The barren frond of the Adder's-tongue is often forked, or even deeply lobed at the extremity, and sometimes two or three spikes of fructification may be seen on one plant; but, excepting in luxuriance of growth, the fern exhibits little variation. The French call the plant

Langue de serpent; the Germans term it *Natterzünglein*; and it is also the *Adderstong* of the Dutch; the *Lingua serpentina* of the Italians; and the *Läketunga* of the Swedes.

2. *O. lusitánicum* (Lesser Adder's-tongue).—*Barren frond* linear, or linear-lanceolate; *fertile frond* club-shaped. This is a little plant very much resembling the Common Adder's-tongue in miniature, having the spike produced from among its bright green tiny leaves in the same manner, but not exceeding altogether two or three inches in height. It has long been known to botanists as a native of Southern Europe, but it was only discovered recently to be wild in Guernsey. Mr. George Wolsey found it among the short herbage of some rocks not far from Petit Bot Bay, on the south coast of the island. It has since been found in Guernsey growing wild in meadows, its fronds being in perfection in the latter part of January.

Order II.—LYCOPODIACEÆ. CLUB-MOSSES.

1. Lycopódium (Club-moss).

1. *L. clavátum* (Common Club-moss, Stag's-horn-moss, Fox-tail, Wolf's-claw).—*Leaves* scattered, linear, curved inwards, hair pointed; *spikes* stalked, two or three together; *scales* egg-shaped, somewhat triangular, serrated. This Club-moss is the commonest of all the



W. Dickes del. et s.

1 COMMON CLUB MOSS,
Lycopodium clavatum

2 INTERRUPTED C. M.,
L. annotinum

3 SAVIN LEAVED C. M.,
L. alpinum

4 MARSH C. M.
L. inundatum.

5 LESSER ALPINE C. M.,
L. selaginoides

6 FIR C. M.
L. selago

species. It occurs in abundance on moors and bogs, and on most of the mountains in the North of England, Wales, and Scotland. It is found in similar places in many of the northern parts of Europe and Asia, and from Canada to Pennsylvania in America. It is a fine-looking plant, having stems creeping some feet in length, and bearing many branches, which are at first a little raised from the ground, but which soon become prostrate. It is sometimes very luxuriant, and Mr. Newman mentions having frequently found plants on a hill near Farnham, in Surrey, measuring ten or twelve yards in circumference. Its stems are attached to the soil at every part where they touch it by scattered yellowish roots, and its branches cross each other, so as to form a large green net-work over the soil; hence the Swedes call the plant *Matte-grass*. These roots and matted branches are of much use in binding down the loose earth on hill-sides, and on the surface of mountains, as this is continually liable to crumble from the action of the atmosphere.

The stiff wiry branches and stems of the Stag's-horn are thickly surrounded with small narrow leaves of a lanceolate form, flat and smooth, but with slightly-toothed edges. The thread-like point, which terminates each little leaf, gives a greyish tint to the otherwise bright green hue of the plant. The upright stalks, on which the spikes are placed, are destitute of leaves, but have some small leaf-like scales irregularly disposed in whorls around them, and pressed close to their surface; they are pointed, but have not the hair-like points of the leaves. The spikes of fructification, which are usually

more than an inch long, are placed each on a partial stalk about twice its length, one or two, or sometimes three, of these terminating the main stalk. They are formed of a number of triangular, egg-shaped, leaf-like bracts, or involucres. The capsules are placed in the angle formed by the bract and the stem. Each is two-valved, kidney-shaped, of a pale yellow colour, and filled with sulphur-coloured powder, single particles of which are too small to be seen by the naked eye. After these dust-like seeds have escaped, the bracts all turn downwards, and thus greatly alter the appearance of the spike.

Though this is the largest of our native Lycopodiums, yet in some other lands, as in the humid regions of the tropics, and in the United States of America, other species form a very conspicuous part of the herbage, not always creeping along the soil like large mosses, but standing erect, like miniature trees. Even these, however, are small in comparison with the club-mosses of older ages; for the geologist finds in the coal strata large species of similar plants, the Lepidodendrons, the numerous kinds of which must have formed an essential part of the vegetation of the forests of remote epochs. They have, with the ferns and horse-tails, contributed more than any other plants to furnish those beds of coal which form so important a material of our comfort, and which have supplied the immense means for the diffusion of knowledge, science, and manufacture, by means of the steam-ship, the steam-engine, and the printing-press.

Those ancient plants, the Lepidodendrons, have stems

of the same essential structure as those of our Club-mosses, are branched in the same way, and have similar leaves and fructification. While, however, our Lycopodiums are so moss-like that the older botanists described them as mosses, the fossil Lepidodendrons must have attained the height of trees, and had thick bases to their stems as large as the trunks of our oaks or firs. Leaves some inches long grew on their stems and branches, and under their shadow were developed those large ferns and horsetails, which are so abundant in the coal-measures, that ferns seem at one time to have formed more than three-fifths of the earth's vegetation. Doubtless they aided by their living growth the purification of the atmosphere, and how much we owe to their decomposed substance no pen can describe. If these gigantic plants are not exactly identical with the modern Lycopodiaceæ, yet they are so nearly so, that little difference can be discovered by those who have most patiently and skilfully investigated the plants of the coal strata.

Our native club-mosses have no very great beauty to recommend them to our notice, save the green tint which they give to the hill-side or mountain-slope, or dripping rock or waterfall. They are a peculiarly Alpine tribe of plants, *L. inundátum* being the only species frequent in the low lands of the south-east of England. The stems of all are clothed with leaves densely crowded upon them, like the tiles on a roof; an arrangement which the botanist terms imbricated. The fructification is placed in the axils of the leaves or bracts, that is, in the angles between these and the stems; and it generally grows in a cone at the top of the stem. It consists of

kidney-shaped capsules which have from one to three valves. Two distinct substances lie inclosed in the capsules of some species. One kind is a small dust-like powder, composed of smooth grains; and the other consists of three or four globular-shaped fleshy bodies, many times as large as the powder. The powder is produced by all the species of club-moss; but the larger fleshy bodies occur but in a few, and are not found in the Stag's-horn.

The club-mosses are called in Italy *Licopodia*, and in Holland *Wolfsklaw*, and the Germans call the plant *Kolbenmos*. In Sweden, wreaths of our common species are commonly worn on festive occasions by the peasantry, and Anna Howitt, when describing the May festival at Starnberg, in Germany, says, "People arrived even faster and faster: there were parties in carriages with servants and gentlemen; there were parties on foot, the gentlemen with wreaths of Ivy or Stag's-horn moss twisted round their straw or felt hats, with gentians, cowslip, or primula flowers stuck into their button-holes." Wordsworth alludes to a similar mode of using the moss in the north of England.

> "Or with that plant which in our dale
> We call Stag's horn or Fox's tail,
> Their rusty hats they trim;
> And thus, as happy as the day,
> Those shepherds wear the time away."

Mr. Matthew Arnold, too, refers to the plant:—

> "Under the glittering hollies Iseult stands
> Watching her children play; their little hands
> Are busy gathering spars of quartz, and streams
> Of stag's-horn for their hats. Anon with screams

Of mad delight, they drop their spoils and bound
Among the holly clumps and broken ground,
Racing full speed, and startling in the rush
The fell-fares and the speckled missel-thrush
Out of their glossy covert. But when now
Their cheeks were flushed, and over each hot brow
Under the feathered hats of the sweet pair
In blinding masses showered the golden hair,
Then Iseult called them to her."

Very pretty ornaments were, in former days, made of the club-moss for summer stoves, and English ladies seem to have worn it occasionally as a head-dress. Gerarde says, "Some have made hatbands, girdles, and also bands to tie such things as they have before gathered, for the which purpose it most fitly serveth." His description of the plant is very graphic: "Some pieces thereof are six or eight feet long, consisting, as it were, of many hairy leaves, set upon a tough string, very close couched, and compact together; from which are also sent forth certaine other branches, like the first; in sundrie places there be sent downe fine little strings, which serve instead of roots, wherewith it is fastened to the upper part of the earth, and taketh hold likewise upon such things as grow next unto it. There spring also from the branches bare and naked stalks, on which grow certaine eares, as it were, like the catkins or blowings of the hasell-tree, in shape like a little club, or the reed-mace, saving that it is much lesser, and of a yellowish-white colour, very much resembling the clawe of a wolfe; whereof it hath its name." He adds, however, that the "knobby catkins are altogether barren, and bring forth neither seede nor flowre."

The astringent properties of this Club-moss were greatly praised by the herbalists, and the plant was used for a variety of disorders. John Ray mentions that a decoction of the club-moss was taken in that dreadful disease, the *Plica Polonica*, hence the plant had the old name of *Plicaria;* but it is little used medicinally now, except by the people of the Orkney Islands, who administer it in some diseases of their cattle. The powdery dust or pollen is of a very inflammable nature, and was formerly called vegetable sulphur, and collected for fireworks, and to represent lightning at theatres. It flashes when thrown into a flame, and it was brought in large quantities into this country from Sweden and Germany, until some preparation of rosin superseded its use in representations of this kind. It seems almost impossible to moisten this powder with water, for, when laid on the surface of liquid in a basin, the finger may be plunged to the bottom of the vessel without being wetted. This substance has also been used for ameliorating wines. Several of the species of the Club-moss might remind one of a miniature tree; and Mr. Fortune relates, in his "Wanderings in China," an amusing anecdote referring to a curious dwarf species which he found on the hills of Hong Kong. He dug up this plant, and carried it with him into the town. The Chinese to whom he showed it was quite in a rapture of delight at its appearance, and all the servants and coolies on the spot gathered round the basket to admire this curious little plant. As Mr. Fortune had never seen them express so much admiration except on one occasion, when he had shown them a cactus called Old Man,

he naturally inquired into the cause of their satisfaction at the appearance of the *Lycopodium*. They replied in Canton English, "Oh! he too muchin handsome; he grow only a leete and a leete every year, and suppose he be one hundred year oula, he only so high," holding up their hands an inch or two higher than the club-moss. "This little plant," says Mr. Fortune, "is very pretty, and naturally takes the form of a dwarf tree in miniature, which was doubtless the reason of its being so much a favourite with the Chinese, who think that a tree attains its greatest beauty when its growth is stunted by their ingenuity."

2. *L. annótinum* (Interrupted Club-moss).—*Leaves* scattered, tipped with a spine, and edged with small serratures; *spikes* without stalks, terminal; *scales* roundish, with a tapering point, membranous and jagged. This plant is so local in growth that it is little known in England, though found in Charnwood Forest in Leicestershire, at Rumworth Moss in Lancashire, Teesdale in Durham, Bowfell in Cumberland, and Langdale in Westmoreland. It grows also on Glyder Vawr on Snowdon, though when seen in 1836, by Mr. Wilson, it had become reduced to a solitary root, and was without fructification. In some districts of Scotland it is very abundant, as it is in many mountainous regions, especially in the north of Europe, growing on wild open places, at a great elevation, or in pine woods; it is also plentiful in some parts of North America. Mr. Watson describes it as pretty frequent between 500 and 850 yards on the mountains of Clova and the west of Aberdeenshire; but adds, "I have never seen it above 900 yards, or below 500."

This Club-moss receives its specific name from the somewhat jointed or interrupted appearance of its branches, which arises from the leaves being at intervals smaller and less spreading. The creeping stem sends out, here and there, several upright branches, from one to four inches long. The length of these is increased every year, and the points of these annual growths are very visible, giving to the stem its interrupted appearance. These upright branches are often again divided, and the spike is usually on the sixth or seventh joint of the branch when fertile, but some branches are barren. This is a large species, sometimes growing even to the height of a foot from the ground, and its narrow leaves, which spread out on all sides of the stems, are arranged in five rows, which, however, are not very distinctly marked. The little saw-edged and stiffly-pointed leaves are without stalks; they are of a yellowish green colour, and have each a distinct mid-rib. On the older parts of the stem the leaves not only spread more than on those newly grown, but they sometimes turn downwards.

The spike of fructification is at the top of the leafy branch, without a partial stalk, and about an inch long. It is oblong, and the bracts or scales upon it are nearly round, with a long narrow point, and a jagged membranous margin. When the seeds are matured and burst from their capsules, these scale-like leaves turn downwards.

3. *L. alpínum* (Savin-leaved Club-moss).—*Leaves* overlapping each other, in four rows, acute, keeled, entire; *spikes* terminal; *branches* erect and clustered.

This is a pretty evergreen species, of a much brighter tint than any other of our Club-mosses. It grows in great abundance on the grassy slopes in the hilly and mountainous districts of Scotland, large tracts of ground being rendered of a rich green by its trailing stems. It occurs in England on the mountains of Yorkshire and Cumberland, and grows in a few Welsh localities. It is found at the elevation of a thousand yards on Carnedd David in Carnarvonshire; and on all the northern mountainous regions of Europe, as in Lapland, Sweden, Norway, Russia, Germany, and Switzerland, it is a common plant, as it also is on the high lands of Canada. Its English name was given from the resemblance of its branches, with the leaves pressed closely around them, to those of the Savine (*Juníperus Sabína*). The roots are very strong and wiry, and are formed of branched, downy, stout fibres. The stem creeps close to the surface of the ground, and bears, at irregular intervals, several upright branches, which are repeatedly divided in a forked manner, forming a close tuft, level at the top, and somewhat fan-shaped. The creeping stem, which is sometimes four feet long, has few leaves; but the smaller branches of the erect stems have small leaves pressed closely round them. These are lanceolate and pointed, the edges without serratures, and they are somewhat boat-shaped, being hollowed out in front where they fit the stem. The leaves overlap each other, and are in four rows, the branches having a somewhat square form. Those branches bearing the spikes of fructification are rather longer than the barren ones, and twice forked. The scales are membranaceous, flat,

broad at the base, tapering upwards and pointed, and placed very closely together. Between each scale and the stem lies a pale yellow, kidney-shaped capsule, filled with minute, yellowish spores. When these are dispersed the scales turn downwards, and the spike bends down into a semicircular form. This plant is said by Sir W. J. Hooker to be used in several countries to dye woollen cloths of a yellow colour. In Ireland, cloth is commonly dyed by boiling it with the Lycopodium, and with the leaves of the Bog Whortleberry. The flavour of this Savin-leaved moss is bitter and somewhat aromatic.

4. *L. inundátum* (Marsh Club-moss).—*Stem* creeping; *branches* simple; *leaves* and *scales* linear, acute, curved upwards; *spikes* solitary. Though this plant is rare in the midland and northern counties of England, it is by no means so in the south. It may often be seen on moist heathy moors, especially where the surface has been pared for turf-growing, amid gorse and broom, not usually forming a mossy tract of wide extent, but occurring here and there, in patches, all over the bog. It is not so conspicuous a plant as to be noticed by many except botanists. Its habit is prostrate; the stem, which is two or three inches long, being closely pressed to the surface of the soil, and attached to it by a few short, but stout, tough, and branched fibres. The branches are simple, the barren ones lying along the ground; the fertile ones upright. All parts of the plant are thickly covered with narrow leaves, without serratures, but acutely pointed; those leaves which are on the barren stems curving upwards. This plant, during

the period of its growth, lengthens at the point, the other end gradually decaying. The winter, which stops the growth, does not arrest the decay, so that little is left of the stem to produce the next year's foliage, while the withered remains of summer look like a number of black marks or lines among the short grass of the heath in spring, resembling a plant which has been scorched and blackened by fire. The green portion of the club-moss is very small at this season, for many plants perish wholly in the winter, and it is only the vigorous ones which may now be seen putting forth their new leaves. The spikes of fructification are produced in autumn, each being at the top of a footstalk rather longer than itself, and nearly of the same thickness; and, as well as the spike, being surrounded by green linear scales rather larger at the base, and sometimes having one or two minute teeth at the sides. The capsules lie between the scales and the stem; they are of a pale yellowish-green, and filled with yellow dust-like powder.

5. *L. selaginoídes* (Prickly Club-moss, or Mountain Moss).—*Stems* procumbent; *leaves* lanceolate, acute; *spikes* solitary; *scales* egg-shaped. This plant is not in any degree prickly in the true sense of the word, and, indeed, its smaller degree of rigidity renders it less so to the touch than most of the species. Its stem is creeping, two or three inches long, very weak and slender, lying close to the ground, and repeatedly branched. The whole plant is covered with lanceolate delicate leaves, their margins beset with small spiny teeth. The fertile branches differ from the winding barren ones in their erect growth, the barren ones being quite trailing.

The former have also their leaves longer and more pressed to the stalk, and the terminal spike of fructification is about an inch long. This is thickly covered with scales, pressed close to its surface, and having their edges jagged with spiny teeth. This is the only British species bearing both the kinds of fructifications alluded to in the description of the genus. The lower scales have the pale yellow capsules seated at their base, containing three or four large grains, equal in size to the seeds of many flowering plants; and the capsules of the upper ones contain the dust-like powder which forms the seed of the Lycopodiums in general. The spike is annual, decaying immediately after the dispersion of its contents, and both kinds of fructification appear to be true seeds of the plant.

6. *L. Selágo* (Fir Club-moss,—Upright Fir-moss).—*Stem* erect, with forked branches; *leaves* in eight rows; *fructification* axillary. This is among our most generally distributed Club-mosses, and is more frequent in this kingdom than any species except the common Club-moss. It often grows on the summits of lofty mountains, as on Snowdon, and on the "dark brow of the mighty Helvellyn;" yet it is a common plant too on the heathy lands of lower districts. It is a moss of old repute among the Highlanders, Selago being the ancient name of some succulent plant, and derived, according to De Theis, from the Celtic *sel*, sight, and *jach*, salutary, because useful in complaints of the eyes. From the same root, *sel*, was formed *Selma*, the name of Fingal's Hall, which corresponds to the modern name Belle-vue. The plant is still used in the Highlands, where it is

made into an irritating ointment, which is rubbed on the eyelids with good effect in some diseases of the eye, and an infusion of this Club-moss is considered by the Highlanders a valuable medicine for several disorders; but it should be used with caution, for its properties are powerful, and too large a dose causes giddiness, and even convulsions, while it is sufficiently caustic to serve as a blister to the skin. It is also used in Skye, and some other places, instead of alum, to fix the dye; and Linnæus mentions that it is employed by the Swedes to destroy vermin.

The Fir Club-moss is not difficult of recognition, even to the unpractised botanist. It usually grows, at first, in a much more erect position than any other native species, though, after a time, it becomes in some measure trailing. Its fructification, too, differs from that of the others, not being arranged in terminal catkin-like spikes, but being produced in the axils of the leaves along the upper branches of the stem. The stems are from three to six inches in height; the plant attaining occasionally, in sheltered situations, a still greater size. One stem only issues from the root, and this is branched two or three times in a forked manner, till it forms a cluster, which is flat at the top, and has from six to ten alternate divisions. The branches are very tough and rigid, their thickly crowded leaves overlapping each other. These little lanceolate leaves are acute and glossy, smooth on the edges, very stiff, and of a rich green colour.

The capsules of fructification are rather large, kidney-shaped, two-valved, and filled with pale yellow minute

dust-like seeds. The plant likewise forms buds, and seems chiefly propagated by their means. These curious little stalked buds consist of three or four egg-shaped leaves of different sizes, placed in the axils of the leaves, chiefly towards the summits of the branches.

Order III. MARSILACEÆ.—PEPPERWORTS.

1. Isoétes (Quillwort).

1. *I. lacústris* (European Quillwort or Merlin's Grass). —*Leaves* awl-shaped, bluntly four-sided, with four-jointed tubes. The Quillworts are aquatic plants, and our only native species of the genus is abundant at the bottoms of lakes and ponds in some hilly districts. The plant renders such a spot very beautiful, as, when seen through the crystal waters, it looks like a meadow of the richest green hue, and, as it is perennial, it adorns them at all times of the year. It occurs in lakes, reservoirs of water, and on marshes and other inundated places in the north of England and Wales, and is frequent in some of the Scottish lakes. Mr. Knapp, remarking on the soil of the Highlands, says that a considerable portion of it is formed chiefly by the granite of rocks, the felspar, quartz and mica having been disintegrated by the elements, and mingled with a little vegetable earth; and that the roots of plants and the lower leaves are generally sprinkled with glittering specks of mica. "So general," says this writer, "is the diffusion of this micaceous earth through Scotland, that we have found the



EUROPEAN QUILLWORT.
Isoetes lacustris
CREEPING PILL WORT
Pilularia globulifera

roots of *Isoëtes lacústris*, digged up from the bottom of Loch Lomond, partaking of this tribute from the mountains, though in an inferior degree to a truly Alpine plant."

The Quillwort occurs in the marshy lands and waters of several parts of Europe, and seems more abundant in Sweden and Denmark than elsewhere. In France the plant is called *L'Isote des étangs;* and in Germany *Der Brachsemfarrn.* Mr. Gardner, when in Brazil, collected from a marsh by the side of a river specimens of a Quillwort which appeared to be identical with the British species, and adds, "The sight of this plant recalled pleasing recollections of long past times, and I could not refrain from indulging in a lengthened train of reflection, which ended by comparing it with myself—a stranger in a strange land—and associated with still stranger companions." The Quillwort occurs also in the northern parts of North America.

To those unacquainted with the plant, its long quill-like leaves would seem, when growing in the water, to be those of some kind of grass, which by its ready growth was quite filling up the pool. It abounds in some of the lakes of Denbighshire, and in those of Llanberis; and at Rydal and the other Westmoreland lakes, and in waters near Coxwould in Yorkshire, as well as at Prestwick Carr in Northumberland, it has long been known and admired for the beauty and greenness which it gives to the still waters.

At the base of the long awl-shaped leaves of this singular plant is a roundish tuber, which is brown and spongy on the outside, but is, within, white and firm.

From these tubers descend a number of long, tubular, somewhat pellucid roots, which are sometimes forked at their extremities. Some botanists have eaten these tubers when young, and consider them to be perfectly innoxious, though having an earthy flavour. The leaves, which arise from the crown of the tuber, are of a somewhat olive-green colour, very brittle, and from four to seven inches long; they are dilated at the base, and clasp around the inner leaves, and their margin is membranaceous. The upper part of the leaf is nearly round, and formed of four hollow tubes, separated from each other by the transverse partitions, which give to the plant its jointed appearance. They taper at the upper part into a sharp point. It is within these broad bases of the leaves, that the fructification lies concealed. The capsules are round and hard. Some of them contain roundish bodies or seeds, which finally open into three triangular valves. The other set of capsules contains extremely minute pollen-like grains, which, however, have, though so much smaller, the same form and character as the larger seeds.

There are two forms of this Quillwort found in our waters; one having leaves slender, erect, and densely tufted, the other having them thicker, shorter, and more spreading: but whether these are distinct species or whether their variation is referable to some accidental circumstance in the conditions of their growth, seems uncertain.

The Quillwort cannot always be easily gathered by botanists, though in some ponds fish root it up, and leave portions of it at the edge of the water. They are

said to feed upon the plant. It is also most eagerly devoured by cattle when placed within their reach, and is believed to be very nutritious food for them.

2. Pilulária. (Pillwort).

1. *P. globulífera* (Creeping Pillwort or Pepper Grass). —*Leaves* thread-like; *stem* creeping; *capsules* slightly stalked, roundish, and hairy. This plant winds along the grass of wet meadows, or in the mud at the margins of lakes or pools, making little show on the moist lands when inundated with the winter's rains, but lying during summer more or less exposed to view. It is, however, easily overlooked, and was long unnoticed by several of our most eminent botanists, though it grew in abundance in the neighbourhoods in which they resided. The Rev. W. T. Bree found it at Coleshill Pool, in Warwickshire, in so great plenty, that he says he has seen it covering the shore to a great extent; yet Mr. Purton remarked, some years since, "This must be the rarest of our indigenous plants, as it is not mentioned in the Cambridge, Oxford, or Bedford Floras; nor is it noticed as a Warwickshire plant in that accurate and laborious work, Dr. Withering's 'Arrangement.'" It is now known to be not uncommon. It grows on the marshes near Penzance in Cornwall; about Polwhele, Devonshire; at Maiden Down in Somersetshire; near Warminster in Wiltshire; on Esher Common; at Roehampton, Surrey, and a large number of well-known localities; being distributed here and there over most parts of the kingdom. It is also familiar to botanists throughout the

greater part of Europe. It is called in France, *La Pilulaire ;* and in Germany, *Pillenfarrn.* It is the *Pilularia* of the Italians and Spaniards ; and the *Pillenkruid* of the Dutch.

This plant is never found in deep water, but forms verdant masses on places occasionally overflowed. Its long entangling stem is hollow, and not larger than a stout thread ; and its younger portion is invested with small scale-like hairs. It is occasionally branched ; and issuing from it at intervals of half an inch or more are small tufts of slender roots, which descend into the soft soil. Three or four fibres are in each tuft, and immediately above each set of fibres rises, from the upper part of the stem, a tuft of from two to six thread-like leaves. These leaves are hollow, bristle-like, about two, inches long, and bright green. They are divided into cells, and, when young, are rolled up like the leafy ferns : they unroll gradually, at first hanging down like a shepherd's crook, but by degrees they become erect.

The capsules containing the spores are placed on short stalks just at the base of the leaves, in the angle formed by the leaf and stem. They are about the size of a peppercorn, and closely covered with jointed hairs of a light brown colour. They consist of four cells, and, when quite ripe, they split open from the upper part into quarters, which still remain on the little stalk. The spores are placed along the centre of the valves, forming four rows ; and the lower part is occupied by granular bodies, and the upper by pollen-like powder. The larger grains are believed to be perfected spores, and the smaller to be spores in their imperfect condition.



1 CORN HORSETAIL
Equisetum arvense

2 ROUGH H
E hyemale

4 SMOOTH NAKED H
E limosum

5 MARSH H
E palustre

Order IV. EQUISETACEÆ.—HORSETAILS.

1. Equisétum (Horsetail).

1. *E. arvénse* (Cornfield Horsetail).—*Barren stems* with few furrows, slightly rough; *branches* rough, with three or four simple angles; *fertile stem* unbranched, with few loose distant sheaths. This is by far the commonest of our native Horsetails, some of which are known to all who observe the plants which grow wild. These plants are commonly called Jointed Ferns, or Leafless Ferns, though they have not a very obvious affinity with the leafy species commonly recognised as ferns. They are destitute of any green expansions; they are jointed at regular intervals, the joints or knots being solid, and surrounded by membranaceous toothed sheaths, while the portions between the joints are hollow. Their branches are rigid and whorled, and the fructification placed in cone-like heads made of scales, to the lower face of which the seed-cases are attached in a row round the margin.

The stem is chiefly composed of cellular matter, but towards the outer portion there is a layer of woody fibre. The cuticle, or thin skin, which covers the Horsetails, is in all the species regularly and beautifully decked with particles of flint, arranged in lines and other forms, often not the five-hundredth part of an inch in diameter. These particles were discovered by Dr. Brewster to lie, in the greater number of cases, in simple straight lines; but others are grouped into oval forms like the beads of

a necklace, and connected together by a minute chain of particles.

The Horsetails are readily distinguished by their leafless stems and the hollow angular channelled branches which are in most cases whorled around them. The different species are not, however, always very readily discriminated, several of these being very similar, and the structure of the sheaths around the joints, and the ridges on the surface of the stems, often form the chief features of their distinction.

The Corn-field Horsetail is not, like most of the species, peculiar to marshy soils, but springs up everywhere, and is not only an annoyance to the farmer, who finds it difficult of eradication from his corn or pasture lands, but is also often a troublesome intruder into the garden. Most of us have amused ourselves in childhood by giving a sudden pull to the stem or branch, and thus separating it into small portions, leaving the sheath in which each portion was enveloped disclosed to view, and needing no microscope by which to discover its little sharp membranous teeth. This species has a long creeping root-stem, which is hollow, very much branched, and jointed like the stem which rises above the ground; and it throws out at each joint a whorl of tough fibrous roots. It has two kinds of fronds, the one fertile, and without branches; the other barren, and surrounded by the green whorls of rigid branches.

The fertile stem rises above ground in March, and is matured by April or May, at which season the barren stems may often be seen lately emerged from the earth, arrayed in the most delicate green colour, and very brittle.

When the fertile stem has attained maturity, it is, when growing on soils suitable to it, about eight or ten inches high, but it is more frequently about half that height. It is hollow, succulent, pale brown, without furrows, and divided at intervals into joints; the length of the spaces between the joints is very variable, the joints at the lower part of the stem being usually closer together than at the upper. The sheaths are yellowish at the base, and have about ten dark brown or black slender teeth, with very sharp points. The upper sheaths are longer than the lower ones, and the black teeth are often tipped with white, and have a white clear margin.

The cone-like fructification is at the top of the stem, and is about an inch long, tapering upwards, terminating in a blunt point, and standing on a distinct footstalk about half its length. It is of a pale, or sometimes of a reddish brown colour. The capsules are attached to round scales, and arranged in whorls around it. The number of scales varies, but they are not so numerous in this species as in some others. In May, when the catkin is matured, and sheds its numerous fine green spores, these, like the spores of other species, are, by the aid of the microscope, seen to be surrounded by delicate threads, which uncoil with such curious movements, that when looking at them we can scarcely persuade ourselves that the motion is purely mechanical, and is not the result of animal life. The oblong capsules, when ripe, open by two valves, and discharge their powder-like spores or seeds.

The barren frond of this Equisetum is a very different looking plant, and is handsomer than the fertile one.

When first it rises, it seems merely a hollow pointed stem, for its branches are not then seen. It is, however, when fully grown, two, or two and a half feet high, and has whorls of long, green, rigid, and four-angled branches, either half way down, or throughout its whole length, and two or more fronds rising from the same part of the creeping stem. In shady situations, as when overtopped by the rising corn, these deep green branches become very long and scattered; but in the drooping attitude which they assume, and in the close growth of ordinary specimens, they are thick enough to remind us of the tail of a horse, and in some cases they are again branched. The stem is slightly marked with about ten or a dozen furrows, and both stem and branches are rough with the minute particles of flint with which they are coated. The sheaths are furrowed, and their wedge-shaped teeth have often a white thin line round the margin.

This rigid plant is a very unwelcome intruder on the pasture land, as cattle, except when pressed by hunger, leave it untouched, and when eaten it is said in some instances to have proved very injurious, though sheep and horses seem to eat it with impunity. It sometimes runs all over the land, and is most difficult of extirpation. It is equally common in other parts of Europe, as well as in Asia and North America. It is in France called *Prêle;* and this, or some very similar species, is the *Kannenkraut* of the Germans. The Dutch call some Common Horse-tail *Akkerig paardestaart;* and these plants are the *Equiseto* of the Italians and Spaniards, while several of the species are commonly known in

Cochin-China by the name of *Mahoang*, and are called *Chwostch* by the Russians. The Horsetails are found in every latitude from the equator to the poles, abounding in the tropical parts of America and Asia, and at the Cape of Good Hope, but becoming rare as we advance towards the polar circles.

Our native species were, by the old writers, termed Shave-grasses, and as this Corn Horsetail has much of the roughness given by the particles of flint, and as it is the most frequent species, it is probably the plant sold in Queen Elizabeth's time by the "Herbe-women of Chepeside," under the names of Shave-grass and Pewterwort, or Vitraria, though it would doubtless have been considered inferior to the *E. hyemále*, which Gerarde calls "the small and naked Shave-grass, wherewith fletchers and combe-makers doe rub and polish their worke." It was very serviceable in the kitchens of olden times, and was doubtless used for cleaning the wooden spoons and platters; the "breen" of our forefathers, as well as the "garnish" of pewter. Although in early days the tables of the opulent were served with silver, yet in humbler households wooden articles were commonly used at the daily meals until the fifteenth and sixteenth century, when pewter came into general use among the higher classes; though not until the beginning of the eighteenth century were the articles made from it sufficiently cheap to admit of their being seen at any save the rich man's table. Harrison, referring to this in 1580, says that in some places "beyond the sea, a garnish of good flat pewter of an ordinarie making is esteemed almost so pretious as the like num-

ber of vessels that are made of silver, and in maner no less desired amongst the great Estates, whose workmen are nothing so skilful in that trade as ours;" and the prices which he gives of the various articles prove their great costliness. The Shave-grasses served for cleaning either kind of ware, and this Corn Horsetail is still used by the dairy-maids in Yorkshire for cleansing wooden milk-pails; while the larger and less frequent plant, the Rough Horsetail, has long been known to our polishers of marble and other similar substances, and, under the name of Dutch Rush, has been imported in large quantities from Holland for their use.

2. *E. hyemále* (Rough Horsetail, Shave-grass, Dutch Rush).—*Stem* erect, rough, strongly marked with lines; *sheaths* short, pressed close to the stem; *teeth* falling off. This species has not, like the last, two distinct kinds of frond, those which bear the catkins being exactly, in all other respects, like those which are barren. It has none of the whorled tail-like branches around the main stem, though now and then a single branch is produced from the base of one of its sheaths. Its roots are strong and black, and its creeping underground stem extends to a great distance, and is jointed and branched by the whorled fibrous roots. The main stem of the frond is usually erect, two or three feet high, hollow, tapering towards the summit, and marked with from fourteen to twenty ridges. These ridges render the stem so rough to the touch that they are like a file, and their crystals of flint display, under the microscope, the most exquisitely beautiful arrangement. They abound both in the inner and outer cuticle, and form a complete framework

to the plant. By some chemical process, the silica may be wholly freed from the vegetable portion, and the entire form of the stem and branches of the Horsetails preserved in beautiful clear crystal; and when the vegetable remains are washed after the process they are found to be quite free from a single particle of flint. The sheaths of this species clasp the stem quite closely, and are marked, though less strongly, with the same number of ridges. Black membranous bristle-shaped teeth, equal also in number to the ridges, terminate the sheath, soon disappearing, and leaving its margin indented with roundish notches, though the teeth of the sheath just beneath the cone remain. The teeth, which are at first pale green, become afterwards black; they are pale in the middle, and have a deep black ring both at the top and base of the sheath.

The catkin of this plant is small, and of a dark colour, and usually terminates the deep green stem; or, if placed at the side, is never at any great distance from its summit. The scales, which are from forty to fifty in number, are marked with two or three lines.

This is not a common species, and is apparently very local in those counties in which it occurs, while it is almost unknown in the midland and southern parts of England. It has been found at Hawthorndean, Durham; in the neighbourhood of Newcastle; in Cumberland and Westmoreland; near Scarborough, in Yorkshire, and several other northern localities; also in South Kent, and in several places in Ireland, Wales, and Scotland. It is common in many moist lands and woods in some continental countries, as in Germany

and Switzerland. In Holland it grows in plenty, and attains great luxuriance on the numerous embankments and by the sides of canals; and the large quantity of the plant brought annually to the London market has led many botanists to think that its culture along our sandy coasts would be of value in a commercial point of view, and that at the same time it would form a firm soil at the margin of the waters. Mr. Francis, who observes that on such places it would grow rapidly and luxuriantly, and would yield a considerable profit, adds, "The Dutch are well acquainted with the value of its long and matted roots in restraining the wasting effects of the ocean, which would soon undermine their dykes, were it not for the *Equisétum hyemále* which is planted upon them." Either this, or some other species, was also highly commended for medicinal virtues, and the expressed juice put into the nostrils, and applied at the same time on the neck, was said to stop the bleeding of the nose. The fresh juice is also used externally as a remedy for wounds.

3. *E. limósum* (Water Horse-tail, or Smooth Naked Horse-tail).—*Stem* erect, smooth, naked, or branched; *sheaths* shut, closely pressed to the stem; *teeth* numerous. Many lovers of stream-sides, of the music of rippling waters, and the beauty of wild flowers, have seen this plant fringing the stream, and mingling with its Forget-me-nots, Willow herbs, and Golden-flag flowers. It is not unfrequent, and is found occasionally in running streams, but is more often to be seen in pools and ditches, its stems standing up in the water or around it, sometimes a yard high. The stem of the Smooth

Horse-tail is marked with distinct ribs, but they are not so raised as to render it harsh to the touch, and their flinty coat is thinner, and formed of more delicate particles than that of some other species. Some of the stems are quite without branches; others have, about the middle, irregular whorls of branches; sometimes there is about half a whorl here and there; in other cases there is a single branch; so that the plant exhibits the most irregular and scattered mode of branching; but the branches are never long and spreading like those of the Corn Horse-tail, nor are they ever rough. The presence of the catkin on the fertile stem forms the only difference between it and the barren one. This is terminal on the main stem, or more frequently on some of the uppermost branches, and it is bluntly egg-shaped. The scales, which are more than a hundred in number, are black, and the capsules are pale coloured. The numerously toothed sheaths are very short.

This plant is so much less flinty in its nature than either of the other species, that it is better fitted for fodder for cattle in this country, though it does not seem to be relished by them while in a green state; but Linnæus says, that in Sweden it is cut up for their food, and that the rein-deer feed on it when dried, though they will not eat common hay. Mr. Knapp, who, in his "Journal of a Naturalist," remarks that it is a favourite food of the common water-rat, adds: "A large stagnant piece of water in an inland county, with which I was intimately acquainted, and which I very frequently visited for many years of my life, was one summer suddenly infested with an astonishing number of the short-tailed water-rat, none

of which had previously existed there. Its vegetation was the common products of such places, excepting that the larger portion of it was densely covered with its usual crop, the Smooth Horse-tail. This constituted the food of these creatures, and the noise made by their champing it we could distinctly hear in the evening at many yards' distance."

4. *E. Mackáyi* (Mackay's Rough Horse-tail, or Long-stemmed Horse-tail).—*Stem* simple, or very slightly branched, rough; *sheaths* close; *teeth* slender, not falling off. This plant, which occurs in mountain glens in Scotland, and in the north of Ireland, is a slender and almost unbranched species, the fertile and barren fronds being alike, save that the former bears a cone. The stems of the fronds arise from a branched rhizome, and are erect, and from two to four feet high. When they happen to be branched the branches are few, and are chiefly on the lower part of one or two of the side stems. The stem is deeply furrowed, having a double row of raised points along the edges, and the furrows vary from eight to fourteen in number. The sheaths, which clasp the stems very closely, are, like them, marked with lines, and terminate with the same number of teeth. These are very narrow, awl-shaped, black, with thin white margins. The black oblong catkin has a little point at the top, and its scales are about thirty in number.

This plant was first discovered in 1833 by two botanists, Dr. Mackay and Mr. Whitla, in Colin Glen, near Belfast. It has since been found in the Den of Airly, in Forfarshire; and on the banks of the Dee, in

Aberdeenshire; as well as at Calton Glen, in Antrim; and Ballyharrigan Glen, Londonderry.

5. *E. palústre* (Marsh Horse-tail).—*Stem* erect, with numerous branches, rough; *sheaths* long and loose; *teeth* long and few. This is a very common species, growing often in great abundance near standing water, and covering places where water has been drained, or growing among the wild flowers of the bog, and reminding us of Clare's lines :—

> "Here Horse-tail round the water's edge
> In bushy tufts is spread,
> With rush and cutting leaves of sedge
> That children learn to dread;
> Its leaves like razors, mingling there,
> Oft make the youngster turn,
> Leaving his rushes in despair,
> A wounded hand to mourn."

The creeping underground stem of this species is nearly as large as the stem of the frond, black, and smooth, and has tufts of black fibres descending from it. The main stem of the frond is perfectly erect, about fifteen inches high, with prominent ribs and deep furrows, about eight in number, rough to the touch, though less so than in some of the species, and whorled throughout, except at the base, with numerous branches. The joints are invested with nearly cylindrical sheaths, which, being much larger than the stem, loosely clasp it, some of the upper ones being nearly twice as large as the stem itself. The number of marginal teeth on the sheath is the same as that of the ribs on the stem. They are light coloured, with black or light brown tips, and membranous margins. The fertile and barren

stems are alike, their branches greatly varying in length in different circumstances. The cone of fructification is slender, about an inch long, and standing on a foot-stalk. The whorls of scales are, at an early period, crowded into a black mass, but after a while are quite separated, showing the white capsules attached to the margin. In June, when these catkins are fully ripened, they become of a brown colour, and, after discharging the spores, wither away; but the bright green whorls of rigid branches remain green till late in the autumn.

There are some singular varieties of this plant, which, however, appear to be dependent on soil and situation, and not to become permanent. One form has been termed *polystachion*. Instead of the one cone usually placed, in the ordinary form of the Horse-tail, on the central stem, several of the branches of the two upper whorls terminate in cones, which are usually darker coloured than the commoner cone, more compact in form, and appearing later in the season.

Another, and rarer variety, called *nudum*, is very much smaller than the ordinary plant, scarcely more than three or four inches high, having the lower part of the stem prostrate, and the branches only about the base of its stem. It is apparently but a dwarfed condition of the plant, caused by want of nutriment. The form termed *alpinum* is very similar, and both are probably the result of growth on a soil less favourable to luxuriance, or of having been cropped by animals.

6. *E. sylváticum* (Wood Horse-tail).—*Stem* erect, branches compound, bending downwards; *sheaths* loose;



I BRANCHED WOOD HORSETAIL
Equisetum sylvaticum

II BLUNT TOPPED II
E. umbrosum

catkin blunt. This pretty species differs so much from our other Horse-tails, that it is readily distinguished even at a glance. Its pale green fronds remind one of a miniature Indian palm, and it is by far the most elegant and graceful of our native species. In wet shady places in the north of this kingdom the plant is not unfrequent, and it must be described rather as local than rare in this country. In Germany and Holland it is very common; it grows, too, in Prussia and Switzerland, as well as in North America and Northern Asia. It is found at a greater altitude than any other species, though it never reaches higher than from 1,800 to 2,400 feet. It is plentiful in the Highlands of Scotland, and in the north of Ireland, and also in several parts of Yorkshire, and other northern counties; and is found occasionally in some southern localities, as on Apse Heath, Isle of Wight, and occasionally in Kent, Sussex, Devonshire, and other counties. Mr. Newman mentions that it grows in the Hampstead and Highgate woods, and says that it is remarkable that it was seen there as long since as the time of Lobel. He adds, "In Scotland I observed it growing with peculiar luxuriance in the vicinity of Loch Tyne, in a little fir-wood on a hill-side. The fructification had entirely disappeared, and each stem had attained its full development, and every pendulous branch its full length and elegance. Altogether I could have fancied it a magic scene, created by the fairies for their especial use and pleasure. It was a forest in miniature, and a forest of surpassing beauty. It is impossible to give an idea of such a scene either by language or illustration."

The brown creeping stem of the Wood Horse-tail is branched, and is tufted with fibrous roots. This plant has two kinds of fronds; they have both erect stems; and both, when fully grown, are surrounded by compound branches, though these are fewer on the fertile than on the barren stem. The fertile stems are at first quite without branches, but these soon develop themselves, and are generally from six to eight in number. The stem is from half-a-foot to two feet in height, of a dull faded looking green colour, succulent, and having about twelve slender ridges, with corresponding furrows. It is not so rough nor so firm as in most of the species, on account of the extreme minuteness of the flinty particles in the cuticle. The margins of the sheaths are cut into three or four lobes, and the sheaths are large and loose; the lower half are pale green, and the lobes of a bright brown colour, and they are marked with the same number of ribs as the stem. The whorled branches are slender, about two inches long, curving downwards; and a marked feature of this species is, that these branches have other branches growing at their joints. These secondary branches are from half an inch to an inch long. The cone, which is matured in April, is long, somewhat tapering, and of a pale brown colour, standing on a slender stalk longer than itself. The scales are more than eighty in number, and when ripened disperse a great number of pale greenish-coloured spores. The cone dies away long before the stem or branches have begun to wither, but it is rarely seen, for this species does not often bear fruit.

The barren stems, which are of a much less succulent

nature than the fertile ones, are taller and more slender and bear more branches; their sheaths, too, though similar, are smaller, and fit the stem more closely, and their ribs are more strongly marked. The compound branches are often crowded on the stem, the side branches being about four inches long, and bearing at every joint a whorl of branches about half that length. Sometimes these are again branched, and drooping down in whorl beyond whorl, the frond becomes exceedingly elegant, narrowing upwards to a slender point, which droops too with the weight of depending branchlets. The terminal branches are 3-ribbed, and somewhat triangular in form, and each joint is terminated by three long pointed teeth of the same colour as itself.

7. *E. umbrósum* (Shady Horse-tail, or Blunt-topped Horse-tail).— *Barren stem* very rough, particularly above, branches simple; *fertile stem* either unbranched, or with simple branches and larger sheaths. This species has not hitherto been found in many places in this kingdom, though it occurs in some parts of Yorkshire, and about the Westmoreland Lakes; at Wynch Bridge, Teesdale, Durham; near Warkworth, in Northumberland; near Mere Clough, Manchester; as well as in several Scottish habitats; and in the mountain glens of Antrim, in Ireland. It was first discovered in the latter locality by Mr. T. Drummond, and hence this plant was formerly termed *E. Drummondii*, but it has since been ascertained to be the species called by Willdenow, *E. umbrósum*. It seems probable that this Horse-tail will be found to be plentiful in woods in the north of this kingdom.

This speeies has three kinds of stem ; one bearing fructifieation only, a seeond bearing both fruit and braneh̄es, and a third with braneh̄es only. The fertile stems are rigid, about six ineh̄es high, of a pale sea-green hue, and with large, loose, and remarkably white sheaths, having a brown rim at the base of the teeth. These are long, narrow, and sharp, and are pale brown with white edges. The oval catkin, eomposed of forty or fifty seales, is at the top of the stem, and of a light brown eolour ; at first seated on the topmost sheath, but shortly rising on a footstalk. It is matured in April.

The braneh̄ed fertile stems have sheaths midway in size between those of the two other kinds of frond. Whorls of braneh̄es are produeed at the uppermost joints. The eone, whieh is terminal on the stem, is smaller than in the ordinary form of the fertile frond, while the number of braneh̄es is fewer than in the barren stem.

The barren stem is ereet, and from eighteen to twenty inches in height; it is very rough, and has about twenty sharp ridges. A few joints at the base are without braneh̄es, the joints on the higher part of the stem produeing whorls of from ten to sixteen drooping branches, which gradually spread so as to form larger eireles. The sheaths are smaller than those of the fertile stem, clasping it more tightly, and have teeth similar in eolour, but shorter, fewer, and less priekly. The slender branches are about four ineh̄es long, 3- or 4-ribbed, and their loose sheaths terminate in three or four short, sharply-pointed teeth, tipped with pale brown.

8. *E. Telmatéia* (Great Horsetail, Great Water Horse-



GREAT WATER HORSE TAIL,
Equisetum telmateja.

VARIEGATED ROUGH H.
E. variegatum

tail, or Great Mud Horsetail).—*Barren stems* erect, with thirty to forty branches in each whorl; *fertile stems* with loose sheaths. This is the largest of our British Horsetails. It is a very graceful plant, and when growing in any quantity, it might remind one of those pictures of Oriental palm-groves familiar to all readers of Eastern travel. It is the barren stem of this Horsetail which is so handsome, growing erect to a height of six or seven feet, decked from its summit nearly to its base with spreading whorls of delicate green branches; and few would see a luxuriant specimen on the stream-side without admiring its grace. On the stouter part of this tall stem the whorls consist of from thirty to forty branches, which are again branched. The whorls on the upper part are very numerous, and the branches six or eight inches long; but towards the base the whorls are more distant, and the branches shorter. The stems, which are pale green, are at their thickest part of the size of a stout walking-stick, gradually tapering upwards, and becoming very slender at the top. Their smooth surface is delicately marked with numerous lines, which, running on into the sheaths, become there more distinct. The sheaths are about half an inch long, the lower part green, the upper encircled by a dark brown ring, and they fit the stem closely. The teeth are slender, dark brown with white edges, and often growing in twos or threes together. The branches have frequently at their second joints from two to five secondary branches; and their sheaths terminate in four or five teeth, each of which extends into a slender black bristle with two

toothed ribs, a character which is very useful in determining the species.

The fertile stems of this species are much shorter than the barren ones, rarely exceeding a foot in height. They are succulent, reddish-white, smooth, and unbranched, with large, loose, funnel-shaped sheaths, the lower ones smaller than the upper. These sheaths, which are pale green at the lower, and dark brown at the higher part, are distinctly marked with lines, and have from thirty to forty long slender teeth. The catkins are two or three inches long, and have an immense number of scales arranged in whorls around them, the lower scales forming distinct rings.

This is not an uncommon, though a somewhat local plant; and notwithstanding its name of Water Horsetail, grows quite as often, or more so, on sandy or clayey moist soils, as on the borders of rivers or ponds, nor is it frequently, if ever, to be seen growing in the water. Its underground stem creeps far in the moist earth, where its black wiry roots increase rapidly, and are very abundant.

When this Horsetail grows in large masses, as it sometimes does in the neighbourhood of London, a third kind of stem is occasionally to be found in August, smaller and shorter than the ordinary stem, its sheaths less spreading, and its cone smaller. This is a dwarfed form of the plant, owing to the spot on which it occurs being not sufficiently moist for its luxuriant growth.

9. *E. variegátum* (Variegated Rough Horsetail).—*Stems* trailing or erect; *sheaths* black at the top; *teeth* few, white, not falling off. This is one of the plants of

the sea-shore, and one which, if it occurs in any quantity, proves valuable in binding down the loose sands. Its underground stem creeps a long way just beneath the surface of the soil, and its root is formed of numerous whorls of fibres. It sometimes grows inland, on the banks of lakes, rivers, and in ditches, and under such circumstances becomes more luxuriant than on the sea-sands.

In this species the fertile and barren stems are alike; they are scarcely if at all branched, except at the base, but they have numerous branches just at the surface of the soil, or on the underground stem just below it. Occasionally the erect stems have a branch, very similar to the stem itself, arising from a joint here and there. The stems, which are about a foot high, are grooved, having from four to ten strong ridges. The sheaths, which are ribbed like the stems, are green below and black above, and their margins are fringed with black teeth of the same number as the ridges on the stem. These teeth have thin white edges and bristle-points.

The catkins are borne at the summit of some of these stems, and are small, black, and pointed, sometimes seated on the uppermost sheath, sometimes elevated on a short footstalk; they have very few scales.

One variety of this plant is by some writers considered a distinct species, and is called *E. arenárium*. It is small, slender, and trailing, and the stem has about six furrows. The *E. Wilsóni* of some writers appears to be but another form of *E. variegátum*; it is much stouter, taller, and more erect in habit, being sometimes

three feet high. The stems are usually without branches, but are sometimes slightly branched. They have about ten ridges, but are not very rough. The sheaths, which are scarcely larger than the stem, are green, with a black rim at the margin. The teeth are short and blunt, black, and edged with white, and the cone is small, black, and pointed.

The *E. variegátum* is abundant on sand hills, on parts of the Cheshire coast, at Wardrew in Northumberland, and elsewhere. It is found chiefly in the north, and several localities in Scotland, Wales, and Ireland are recorded as places of its growth.

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